



NATURAL HISTORY  
OF PLANTS.

Banquet



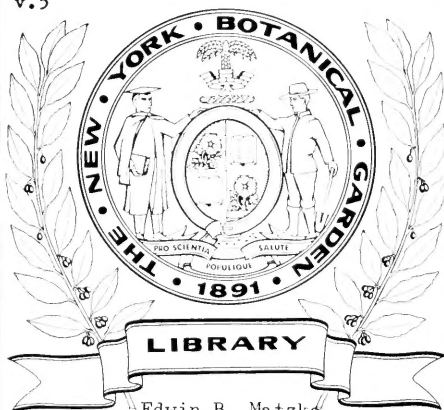
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THE  
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VOL. V.



THE  
NATURAL HISTORY  
OF  
PLANTS.

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VOL. V.

GERANIACEÆ, LINACEÆ, TREMANDRACEÆ,  
POLYGALACEÆ, VOCHYSIACEÆ, EUPHORBIACEÆ, TEREBINTHACEÆ,  
SAPINDACEÆ, MALPIGHIACEÆ, MELIACEÆ.

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# NATURAL HISTORY OF PLANTS.

## XXXVI. GERANIACEÆ.

### I. BIEBERSTEINIA SERIES.

We shall not commence the study of this family with the Geraniums although it owes its name to them; for they have not

*Geranium Robertianum.*

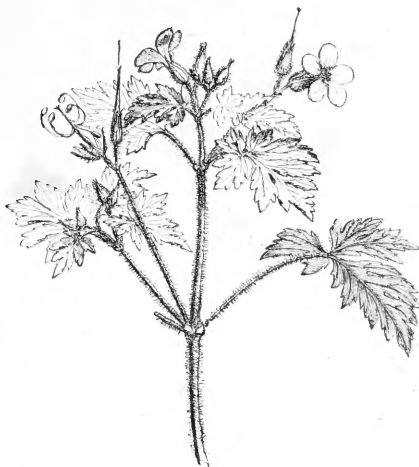


Fig. 1. Floriferous branch.

independent carpels, and the type in which this disposition exists is *Biebersteinia*<sup>1</sup> (fig. 2-7). We shall then first analyse the flowers which are regular and hermaphrodite, with convex receptacle. This

<sup>1</sup> STEPH. in *Mém. Soc. Nat. Mosc.* i. 89, t. 9.—  
DC, *Prodr.* i. 707.—A. JUSS. in *Mém. Mus.* xii.  
458.—ENDL. *Gen.* n. 6044.—LINDL. *Veg. Kingd.*  
471.—JAUD. et SPACH, *Consp. Gen.* *Biebersteinia*

(in *Ann. Sc. Nat.* sér. 3, vi. 137).—B. H. *Gen.*  
271, n. 1.—SCHNIZL. *Iconogr.* xii. t. 253.—H.  
BN, in *Adansonia*, x. 317.

bears, from below upwards, a calyx of five sepals, and a corolla of five alternate petals, imbricated in præfloration.<sup>1</sup> The androecium is

*Biebersteinia Emodi.*

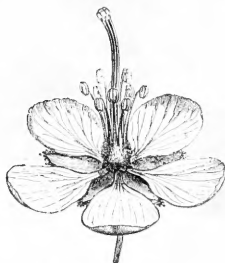


Fig. 3. Flower (♀).



Fig. 2. Bud (♀).



Fig. 5. Longitudinal section of flower.



Fig. 6. Ripe carpel (♀).



Fig. 4. Diagram.



Fig. 7. Longitudinal section of ripe carpel.

formed of ten stamens, superposed, five to the sepals, and five to the petals; the latter are longer than the former. They have their filaments inserted below the ovary, united among themselves below, then free and each surmounted by a bilocular, introrse, versatile anther, dehiscing by two longitudinal clefts. Without the androecium and between the petals are found five glands of variable form. The receptacle tapers to a thin columella supporting five oppositipetalous independent carpels. They are each composed of a unilocular ovary, whose internal angle bears a placenta, on which is inserted a single incompletely anatropous descending ovule with superior, exterior micropyle.<sup>2</sup> About halfway up the internal edge of this ovary is inserted a free style, which soon joins with the other four styles in forming a slender fluted column, with slightly swollen stigmatiferous

<sup>1</sup> The petals are sometimes contorted (fig. 4).

<sup>2</sup> With double coat.

apex. The fruit, enveloped in a persistent accrescent calyx, is composed of five achenes with rugose reticulated surface; each contains a fornicate seed whose coats cover a thin fleshy albumen with curved embryo, the cotyledons being flat, or more or less folded, and the radicle conical and superior. *Biebersteinia* consists of perennial herbs from Greece, the East, and Central Asia.<sup>1</sup> From the perennial stem, which is often short and more or less swollen into a tuberous mass, partly subterranean, spring the leaves, which are alternate, pinninerved, dissected or compound, accompanied by two lateral stipules, often adnate to the petiole for a variable distance and bearing, like most of the organs of this plant, hairs generally capitate and glandular. The flowers<sup>2</sup> are disposed in axillary pedunculate racemes; and each floral pedicel, situated in the axil of a bract, is accompanied by two lateral bractlets.

## II. GERANIUM SERIES.

The Geraniums<sup>3</sup> (fig. 1, 8–14) have regular hermaphrodite flowers. The convex receptacle bears five free sepals,<sup>4</sup> disposed in quincuncial præfloration in the bud, and five alternate petals, also free, contorted or more rarely imbricated in the bud, and generally alike.<sup>5</sup> The androecium is formed by ten stamens, superposed, five to the petals and five to the sepals, the latter being shorter than and exterior to the others.<sup>6</sup> Each is composed of a filament, dilated at the base, and free or united for a very short distance with the neighbouring filaments, and of a bilocular, introrse, versatile anther, dehiscing by two longitudinal clefts.<sup>7</sup> Outside the androecium the receptacle

<sup>1</sup> SPACH admits seven species in this genus which BENTH. and HOOK. reduce to three. LEDEB. *Fl. Alt.* iii. 225, t. 447.—ROYLE, *Himal.* t. 30.—BGE. *Verz. Atl. Pl.* 80.—JAUB. et SPACH, *Ill. Pl. Or.* ii. 108, t. 190–193.—BOISS. *Diagn. Pl. Or.* ii. 113; *Fl. Or.* i. 899.—WALP. *Ann.* i. 152; vii. 482.

<sup>2</sup> White or yellow.

<sup>3</sup> *Geranium* T. *Inst.* 266, t. 142 (part).—L. *Gen.* n. 389.—ADANS. *Fam. des. Pl.* ii. 388.—J. *Gen.* 268.—GERTN. *Fruct.* i. 383, t. 79.—LAMK. *Diet.* ii. 647; *Suppl.* ii. 738; *Ill.* t. 573.—L'HERIT. *Geraniolog.* 30–40.—DC. *Prodr.* i. 639.

—SPACH, *Suit. à Buffon*, iii. 280.—ENDL. *Gen.* n. 6046.—PAYER, *Organog.* 58.—A. GRAY, *Gen. Ill.* t. 150.—B. H. *Gen.* 272, n. 4.—H. BN. in *Payer Fam. Nat.* 399.

<sup>4</sup> Their apex often has outwardly a more or less elongated point.

<sup>5</sup> But sometimes slightly dissimilar in size and colour, recalling thus the normal disposition of the *Pelargoniums*; then especially the præfloration is imbricated.

<sup>6</sup> Voy. A. DICKSON, in *Adansonia*, iv. 187.

<sup>7</sup> The colour of the anthers is often reddish.

bears five alternipetalous glands. The gynæceum is free, superior, formed of an ovary with five cells, superposed to the petals, surmounted by a style which above separates into five branches stigmatiferous within. In the internal angle of each cell there is a longitudinal placenta supporting two ovules. These are collateral

*Geranium sanguineum.*



Fig. 8. Flower.

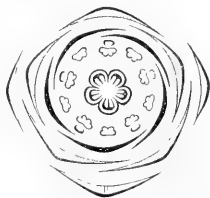


Fig. 9. Diagram.

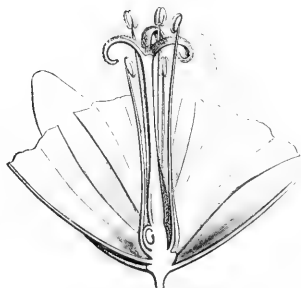


Fig. 10. Long. sect. of flowers ( $\frac{1}{4}$ ).



Fig. 11. Fruit ( $\frac{1}{2}$ ).

or almost superposed, descendent, anatropous with micropyle directed outwards and upwards.<sup>1</sup> The fruit, generally accompanied at its base by the persistent calyx,<sup>2</sup> is dry, surmounted by a style, and opens at maturity, so that each of the cells separates by septifragal dehiscence from the axis of the fruit.<sup>3</sup> The cell rises elastically

violet, or even bluish. The pollen is in spherical grains, opaque; "on three sides an elliptical cavity; in this is a papilla which swells in water; external membrane coarse or papillose" (H. MOHL, in *Ann. Sc. Nat.* sér. 2, iii. 335). The pollen is generally the same as in *Erodium Pelargonium*, etc.

<sup>1</sup> They have two coats. Sometimes one of

the two ovules being displaced it becomes more or less obliquely ascendent.

<sup>2</sup> They are generally applied to the young fruit after the fall of the petals.

<sup>3</sup> HOFMEISTER has studied this phenomenon of dehiscence in a work where he has also shown how the cells are prolonged above into



from below upwards, supported below by a long tongue which separates from the style above the cell, and curves or coils itself spirally.<sup>1</sup> Thus one or two seeds are set at liberty, each at first enclosed in a cell, containing under their coats a not very thick and

*Geranium Robertianum.*



Fig. 13. Seed ( $\frac{1}{2}$ ).

Fig. 12. Dehiscent fruit.

Fig. 14. Embryo.

fleshy albumen, often reduced to a membranous layer, and enveloping an embryo whose radicle is incumbent to the folded-induplicate or convoluted cotyledons.<sup>2</sup> The *Geraniums* are herbaceous plants or more rarely suffrutescent, with branches knotted or articulated at the insertion of the leaves. These are alternate or opposite,<sup>3</sup> petioulate, accompanied by two lateral stipules with limb dentate digitinerved or more rarely penninerved, lobed or dissected. The flowers<sup>4</sup> are united in various numbers,<sup>5</sup> in uniparous cymes, often taken for short racemes or umbels, on a common peduncle, axillary or lateral

five channels furnished inwardly with hairs, the channels terminating below the stigmata. These channels conduct to a cleft opening between the two ovules of the same cell, and show there the presence of a papillose tissue conducting to the micropyle, and which is doubtless an obturator (see *Flora*, 1864, 401).

<sup>1</sup> This tongue is very hygrometric, and in the fruit at one period the carpels are clearly raised (fig. 11). The inner surface and edges of the tongues are often glabrous.

<sup>2</sup> The embryo is often green. There is often only a very small quantity of mucous albumen

between the folds. The seed is very often deformed, and more or less pressed out of shape by the neighbouring seed, and the walls of the pericarp.

<sup>3</sup> In the latter case they are sometimes even in false pairs, the youngest being drawn on level or nearly so with the older one; we may also observe in this genus false verticels of leaves.

<sup>4</sup> White, pink, violet, bluish, or of a more or less dark purple, sometimes coloured purple on a white ground.

<sup>5</sup> Often only one or two, the youngest being lateral.

to the leaves or clearly terminal.<sup>1</sup> Some hundred species<sup>2</sup> are known; but on account of being reckoned twice over the number is sometimes made a hundred and fifty, or more. They inhabit all the temperate regions of the world, and the more elevated and cooler parts of the mountains in tropical and subtropical regions.

*Erodium*,<sup>3</sup> formerly united to the Geraniums, has been artificially separated as a genus because its oppositipetalous stamens are sterile and reduced to squamiform filaments. Their fruits present differences of little value<sup>4</sup> and their organs of vegetation are the same. Some fifty species are described<sup>5</sup> inhabiting the temperate regions. Some are found in South Africa and Australia.

*Monsonia*,<sup>6</sup> numbering some fifteen species,<sup>7</sup> inhabiting South and Eastern Africa, and tropical Western Asia, consists on the contrary of Geraniums with fifteen stamens which seem to form, at the adult age, five alternipetalous bundles. In each bundle is a central stamen larger than the rest and superposed to a sepal, the lateral stamens forming a pair at first oppositipetalous.<sup>8</sup> This genus, which has been divided into three sections,<sup>9</sup> belongs to Southern and Eastern Africa, and to the East.

<sup>1</sup> Whence it results that when the inflorescence is lateral or oppositifolius, it is often drawn up and raised.

<sup>2</sup> CAV. *Diss.* t. 76-97, 124-126 (part).—REICHB.  *Ic. Fl. Germ.* t. 187-198.—H. B. K. *Nov. Gen. et Spec.* v. 229.—GREN. et GODR. *Fl. de Fr.* i. 297, 313.—SIBTH. *Fl. Græc.* t. 659-661.—STEV. in *Mém. Soc. Hist. Nat. Mosc.* iv. 50, t. 5.—BOISS. *Fl. Or.* i. 869.—JACQUEM. *Voy. Bot.* t. 37, 38.—WALL. *Pl. As. Rav.* t. 209.—WIGHT, *Ill.* t. 59.—BENTH. *Fl. Austral.* i. 295.—HARV. et SOND. *Fl. Cap.* i. 257.—HOOK. *F. Fl. Antart.* t. 5; *Man. N.-Zea.* *Fl.* 35.—HOOK. *Icon.* t. 198.—A. S. H. *Fl. Bras. Mer.* i. t. 20.—C. GAY, *Fl. Chil.* i. 387.—OLIV. *Fl. Trop. Afr.* i. 290.—A. GRAY, *Man.* ed. 5, 107; *Unit. St. Expl. Exp. Bot.* i. 308, t. 29-31.—CHAPM. *Fl. S. Unit. St.* 65.—WALP. *Rep.* i. 447; ii. 819; v. 389; *Ann.* i. 139; ii. 234; iv. 395; vii. 483.

<sup>3</sup> L'HER. *Geraniolog.* t. 1-6.—DC. *Prodr.* i. 644.—SPACH, *Suit. à Buffon*, iii. 303.—MEISSN. *Gen.* 57.—ENDL. *Gen.* n. 6045.—A. GRAY, *Gen. Ill.* t. 151.—B. H. *Gen.* 272, n. 5.—H. BN. in *Payer Fum. Nat.* 400.—*Scolopacium*, ECKL. et ZEYH. *Enum.* 59.—? *Isopetalum* SWEET, *Geran.* t. 226 (ex B. H. *loc. cit.* 273).

<sup>4</sup> The tails which support the cells after dehiscent are generally covered inside with long

yellow hairs.

<sup>5</sup> CAV. *Diss.* t. 76-97.—REICHB.  *Ic. Fl. Germ.* t. 183-186 (*Herodium*).—SIBTH. *Fl. Græc.* t. 651-658.—GREN. et GODR. *Fl. de Fr.* i. 307, 313.—JAUB. et SPACH, *Ill. Pl. Or.* t. 189, 203, 204.—BOISS. *Fl. Or.* i. 884.—HARV. et SOND. *Fl. Cap.* i. 258.—OLIV. *Fl. Trop. Afr.* i. 292.—BENTH. *Fl. Austral.* i. 297.—A. GRAY, *Man.* ed. 5, 108; *Unit. St. Expl. Exp. Bot.* i. 317.—A. S. H. *Fl. Bras. Mer.* i. t. 19.—WALP. *Rep.* i. 445; ii. 818; v. 379; *Ann.* i. 137, 965, ii. 233; iv. 392.

<sup>6</sup> L. *Mantiss.* n. 1268.—J. *Gen.* 269.—L'HER. *Geraniolog.* t. 41, 42.—DC. *Prodr.* i. 638.—ENDL. *Gen.* n. 6049.—PAYER, *Organog.* 62, t. 12.—B. H. *Gen.* 271, n. 2.—*Holopetalum*, KL. in *Linnaea*, x. 428.—*Sarcocaulon*, B. H. *Gen.* 272, n. 3.

<sup>7</sup> CAV. *Diss.* t. 74, 75, fig. 1, 2; 113, fig. 1.—SWEET, *Geran.* t. 77, 199, 273.—WIGHT, *Icon.* t. 1074.—BOISS. *Fl. Or.* i. 897.—HARV. et SOND. *Fl. Cap.* i. 254, 256 (*Sarcocaulon*).—OLIV. *Fl. Trop. Afr.* i. 289.—WALP. *Rep.* i. 451; *Ann.* ii. 236.

<sup>8</sup> VOY. PAYER, *Organog.* 60.—A. DICKSON in *Adansonia*, iv. 193, 200.

<sup>9</sup> 1. *Holopetalum* (DC.). Petals entire or emarginate leaves dentate or crenulate.—2. *Odontopetalum* (B. H.). Petals dentate. Leaves lobed or multifid. *Sarcocaulon* (DC. *Prodr.* i. 638).

*Pelargonium*<sup>1</sup> (fig. 15-17) has been reasonably defined as consisting of *Geraniums* with irregular flowers. The sepals, five in number, are disposed in quincuncial præfloration in the bud, sepal 2 being posterior and sepals 1 and 3 anterior. These two latter, like sepals

*Pelargonium inquinans.*



Fig. 15. Long. sect. of flower ( $\frac{3}{4}$ ).

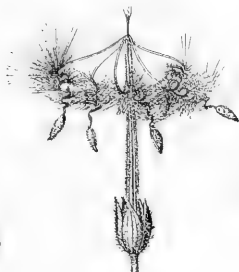


Fig. 17. Dehiscent fruit ( $\frac{3}{4}$ ).

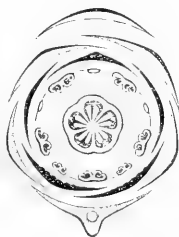


Fig. 16. Diagram.

4 and 5, which they cover, are inserted by a narrow horizontal base as in the preceding genera, while the posterior has a peculiar form and mode of insertion. The highly developed base is much curved and concave above, so that its insertion has the shape of a horseshoe with long branches very near each other. Between this base and the corresponding side of the receptacle, which is furrowed, is found a long tubular cavity whose inner surface is glandular towards the bottom, and which forms a spur united or adnate to the pedicel.<sup>2</sup> The corolla is also irregular, formed of five petals alternate with the sepals, and imbricated in the bud. The two posterior are alike, as are also the two lateral which they envelop in præfloration; but these have not generally exactly the same colour, form, nor size as the two posterior

Fleshy plants with defoliate thorny petioles, and caducous or sessile limbs, small.

<sup>1</sup> L'HER. *Geran.* t. 7-35, 43, 44.—DC. *Prodr.* i. 649.—SPACH, *Suit. à Buffon*, iii. 307.—ENDL. *Gen.* n. 6048.—PAYER, *Organog.* 59, t. 13.—H. Bx. in *Payer Fam. Nat.* 400.—B. H. *Gen.* 273, n. 6 (incl.: *Campyllia* SWEET, *Ciconium* SWEET, *Cortusina* ECKL. et ZEYH. *Dibrachia* ECKL. et ZEYH. *Dimarcia* SWEET, *Eumorpha* ECKL. *Grenvillia* SWEET, *Hoarea* SWEET, *Isopetalum* ECKL. *Jen-*

*kinsonia* SWEET, *Myrrhidium* ECKL. *Otidia* SWEET, *Peristera* ECKL. *Phymatanthus* SWEET, *Polyactium* ECKL. et ZEYH. *Polychisma* TURCZ. *Seymouria* SWEET).

<sup>2</sup> Sometimes we see the flowers of *Pelargonium* provided with three spurs of this kind, two of which are accidental, situated on the anterior side of the pedicel; the sepals 1 and 3 may in this case acquire abnormally the mode of insertion of sepal 2.

ones. They are oftener more like the anterior petal in size and colour, enveloped by them in præfloration, but which, being situated on the medial line of the flower, has its two halves symmetrical<sup>1</sup> (fig. 16). The androecium is formed of ten stamens united for a variable distance at their base, and disposed on two verticels. As a rule, seven of them are fertile and provided with a bilocular introrse anther, dehiscing by two longitudinal clefts. These are the five stamens superposed to the sepals and the two superposed to the posterior petals. The three others, or a larger number, are reduced to filaments sometimes very short or scarcely visible. The number of fertile stamens may be not more than five or three. The gynæceum is quite that of the *Geraniums*,<sup>1</sup> as are also the fruit and seeds in which the albumen is generally wanting or reduced to a thin membrane. *Pelargonium* consists of shrubs, undershrubs and herbs, whose organs are often charged with glandular capitate hairs, viscous and aromatic. The leaves, alternate or opposite, and the inflorescences are the same as in *Geranium*. More than three hundred species have been described, almost all natives of central Africa. But the number of admitted species is considerably reduced and this region only really possesses about a hundred and fifty.<sup>2</sup> There are three or four in North and East Africa,<sup>3</sup> and nearly as many in Australia and New Zealand.<sup>4</sup> A certain number of distinct genera have been formed of them which are now rightly reduced to sections, the characters being drawn from the stems, leaves and flowers.<sup>5</sup>

<sup>1</sup> This petal may be quite wanting or very small. The lateral petals are rarely wanting, but they may be very small, reduced to narrow tongues, hidden by the sepals.

<sup>2</sup> AIT. *Hort. Kew.* ii. 417.—JACQ.  *Ic. Rar. t.* 510-521.—JACQ.  *f. Ecl. t.* 97.—CAY.  *Diss. t.* 97-123 (*Geranium*).—HARV. et SOND.  *Fl. Cap. i.* 259.—WALP.  *Ann. iv.* 397; vii. 488.

<sup>3</sup> FENZL, in  *Russeg. Reis. t.* 3.—BOISS.  *Fl. Or. i.* 898.— *Bot. Mag. t.* 4946.—WALP.  *Rep. ii.* 820;  *Ann. ii.* 237.

<sup>4</sup> HOOK.  *f. Fl. N.-Zel. i.* 41;  *Fl. Tasm. i.* 57.—HUEG. in  *Bot. Arch. t.* 5.—NEES, in  *Pl. Preiss. i.* 163.—F. MUELL.  *Pl. Vict. i.* 170, t. suppl. ii. Turcz. in  *Bull. Mosc. (1858), i.* 149, 421.—BENTH.  *Fl. Austral. i.* 298.

<sup>5</sup> HARVEY ( *Fl. Cap. i.* 260) has in this way

distributed this genus into 15 sections, adopted by Benth. and Hook :

1. *Hoarcea* (SWEET,  *Geran. t.* 18). Herbæ acaul. rhizom. tuberoso, petalis 4, 5 (*Dinacria* SWEET, t. 46;—*Grevillea* SWEET, sub. t. 262).

2. *Seymouria* (SWEET, t. 206). Herb. acaul. rhizom. tuberoso, petal. 2.

3. *Polyactium* (DC.; —ECKL. et ZEYH.  *Enum. 65*). Herb. caulesc. rhiz. tuber. fol. lobat. v. pinnatim decomp. infloresc. ∞-floris, petal. subæqual. obovat. integr. v. lacer. (*Polyschisma* Turcz. in  *Bull. Mosc. (1859, i.* 269).

4. *Otidia* (SWEET, t. 98). Caul. succul. nodos. fol. carnos. pinnat. v. 2-pinnat. petal. subæqual. basi auriculatis.

5. *Ligularia* (ECKL. et ZEYH. 69). Caul. succul. v. tenuis ramos., fol. raro integr. sæpius mul-

## III. NEURADA SERIES.

*Neurada*<sup>1</sup> (fig. 18, 19) has regular hermaphrodite flowers, whose receptacle has the form of a concave cup. On the edges of this is inserted a gamosepalous calyx, with five valvate divisions, in the

*Neurada procumbens.*



Fig. 18. Flower ( $\frac{2}{3}$ ).



Fig. 19. Long. sect. of flowers.

intervals of which and outside them an equal number of bractlets are seen forming an epicalyx. The petals are five in number, inserted perigynously like the calyx and androecium, equal, but little developed, contorted in the bud. The stamens are superposed, five to the divisions of the calyx, and five shorter to the petals; all are composed of a free filament and a two-celled anther, introrse, dehiscing by two longitudinal clefts. The carpels, ten in number,<sup>2</sup> are

tisect. v. pinnat. decomp. inequal. spathul. superiorib. basi angustat. stam. 7.

6. *Jenkinsonia* (SWEET, t. 79). Caul. frutic. v. succul. fol. palmatinerv. v. lob. petal. 2, super. cæc. multo major. longe unguiculato.

7. *Myrrhidium* (DC.;—ECKL. et ZEYH. 71). Caul. gracil. ann. v. suffrut. fol. pinnatifid v. pinnatisect. sepal. membranac. costat. et mucronat. v. acuminat. petal. 4, rar. 5, super. 2 majorib. stam. 5, v. rar. 7.

8. *Peristera* (ECKL. et ZEYH. 72). Herb. diffus. ann. v. perenn. (habit. *Gerani*), fol. lobat. v. pinnatif. flor. minut. petal. calyce vix longioribus.

9. *Campylia* (SWEET, t. 75). Caul. brev. subsimpl. fol. longe petiol. integr. v. dentat. stipul. membran. flor. longe pedicell. petal. 2 super. late obovat. infer. 3 angust. stam. fertil. 5 (*Phymatanthus* SWEET, t. 43).

10. *Dibrachya* (ECKL. et ZEYH. 74). Caul. debil. articul. ramosiss. fol. peltatis v. cordatolob. carnos. (*hederaceis*), petal. obov. stam. perfect. 7, super. 2 brevissimis.

11. *Eumorpha* (ECKL. et ZEYH. 77). Caul. herbac. v. suffrut. gracil. fol. longe petiol. palm. 5-7-nerv. lobat. v. palmatifid. petal. inæq. super. 2 latior. stam. perfect. 7 (*Isopetalum*

ECKL. et ZEYH. 76).

12. *Glaucophyllum* (HARV.). Frutic. fol. carnos. simpl. v. 3-natim compos. lamin. cum petiol. articul. stam. perfect. 7.

13. *Ciconium* (SWEET, t. 13). Frutic. ram. carnos. fol. cordat. v. obov. palmat. -∞-nerv. indiv. petal. concolor. stam. perfect. 7, super. 2 brevissimis.

14. *Cortusina* (ECKL. et ZEYH. 77). Caud. brev. crass. carnos. ram. (dum adsint) tenerib. suherbac. fol. longe petiolat. renif. v. cordat. lobulat. petal. subæq., super. 2 latior. stam. perfect. 6, 7.

15. *Pelargium* (HARV.). Frutic. v. suffrut. ramos. haud carnos. fol. integr. v. lobat. haud pinnatipart. stipul. liber. infloresc. subpaniculat. pedunc. super. umbellat. petal. 2 super. longior. et latior. stam. perfect. 7.

<sup>1</sup> B. JUSS. in *L. Gen.* n. 587.—*J. Gen.* 336.—GÆRTN. *Fruet.* i. 162, t. 32.—POIR. *Dict.* iv. 476.—LAMK. *Ill.* t. 373.—DC., *Prodr.* ii. 548.—ENDL. *Gen.* n. 6401.—B. II. *Gen.* 625, n. 61.—NEWAS DIOSC.—*Chamaedrifolia* PLUK. (ex ADANS. *Fam. des Pl.* ii. 293).

<sup>2</sup> As in *Grietum*, five of the carpels or a smaller number may be wanting. These are the alternipetalous carpels or some of them.

formed each of a unilocular ovary lodged in the cupular receptacle, so that the base is applied outwards to the internal wall of the cup, and the summit directed obliquely inwards. From this point springs the style, rising vertically, without adhering to the other styles, which have not the same length in all the carpels, each terminating in a small stigmatiferous head. The fruit is formed of from five to ten capsules which remain incrustated in the concavity of the receptacle. On the outside persist the calyx and epicalyx developing more or less unequal spines. In each capsule, dehiscing by an upper cleft, is seen an oblique seed the coats covering a fleshy embryo, with plano-convex cotyledons and cylindrical radicle. The only known species of this genus<sup>1</sup> is an annual herb growing in the sandy regions of North and East Africa. The stems, finally ligneous at the base, covered, like the rest of the plant, with an abundant woolly down, separate into branches which spread upon the ground, and are covered with alternate petiolate pinnatisect or lobate leaves, accompanied by one or two small lateral stipules (?). The flowers are axillary or nearly so, solitary and pedunculate. When the seeds are ripe, they germinate in the indurated fruit which they attach to the ground, it being often found at the base of a plant bearing the fruit of the following generation.

On looking at the very singular habit and dull corolla of *Neurada*, we can understand its having been generally placed in a family very distant from the present.<sup>2</sup> But when we observe an inseparable genus *Grielum*,<sup>3</sup> only distinguished by its calyx without epicalyx, and its much developed contorted petals, in every way resembling those of *Geranium*, we cannot but admit that the *Neurades* are *Biebersteinieae* in which the carpels are inserted in a concave floral axis instead of on a more or less prominent receptacle, *i. e.*, of the perigynous Geraniums. The three known species of *Grielum*<sup>4</sup> are natives of the sandy and salt plains of South Africa.

<sup>1</sup> *N. procumbens* L. *Spec.* 631.—FORSK. *Aeg.*—*Arab.* 90.—WIGHT, *Icon.* t. 1596.—HOOK. *Icon.* t. 840.—*Tribulastrum africanum*, LIPPI.

<sup>2</sup> That of Rosaceae, with which they have nothing in common but their perigynous character. BURMANN (*Geran.* 1) and SWEET (*Geran.* ii. t. 171), and later PLANCHON in *Voy. Linden*, 47, admitted their affinities with *Gera-*

*niaceae*.

<sup>3</sup> L. *Gen.* n. 587.—GERTN. *Fruct.* i. 188, t. 36.—DC. *Prodr.* ii. 549.—ENDL. *Gen.* n. 6402.—B. H. *Gen.* 626, n. 62.

<sup>4</sup> BURM. *Afr.* t. 34, 53.—THUNB. *Fl. Cap.* 509.—BURCH. *Voy.* i. 286.—HARV. et SEND. *Fl. Cap.* ii. 304.

## IV. BALBISIA SERIES.

The flowers of *Balbisia*<sup>1</sup> (fig. 20–22), resembling outwardly those of *Geranium*, are hermaphrodite and regular, with a convex receptacle, five unequal sepals, quincuncially imbricated in the bud, and five alternate contorted petals. The stamens destitute of glands at

*Balbisia verticillata.*

Fig. 21. Gynæceum (♂).



Fig. 20. Long. sect. of flower (♂).



Fig. 22. Dehiscent fruit.

the base are ten in number, superposed, five to the sepals, and five, more exterior, to the petals, each being formed of a free filament and a two-celled anther, with almost marginal dehiscence. The gynæceum is composed of a free ovary with five alternipetalous cells, surmounted by a style with five thick branches, charged within and upon the edges with stigmatic papillæ. Each ovary cell presents, in its internal angle, a placenta supporting an indefinite number of ovules in two vertical series. The fruit, accompanied at its base by the persistent calyx, is a capsule separating above into five valves loculicidal at the summit, and allowing the seeds to escape which contain under their coats a fleshy albumen and an axile embryo whose radicle is folded between or upon the folded cotyledons. *Balbisia* is composed of suffrutescent plants of Peru or Chili, more

<sup>1</sup> CAV. in *Ann. Scienc. Nat.* vii. 62, t. 46.—DOX, in *Edinb. New Phil. Journ.* xi. 276.—KL. in *Linnaea*, x. 431.—B. H. *Gen.* 276, n. 13.—H. BN. in *Payer Fam. Nat.* 397.—*Ledocarpum* DESP. in *Mém. Mus.* iv. 250.—DC. *Prodr.* i. 702.—J.

in *Mém. Mus.* v. 231.—*Ledocarponi* ENDL. *Gen.* n. 6050.—*Cistocarpum* K. in *Mém. Soc. Hist. Nat. par.* iii. 380 (ex ENDL.).—*Cruckhanksia* HOOK. *Bot. Misc.* ii. 211, t. 90.

or less charged with silky and whitish hairs. The leaves are alternate or opposite, often tripartite, exstipulate. The flowers are solitary, terminal, pedunculate. Immediately below the calyx are inserted about ten narrow elongated bracts forming an epicalyx.<sup>1</sup>

*Rhynchotheca spinosa.*



Fig. 23. Floriferous branch.



Fig. 27. Gynæceum, one cell open (3/4).

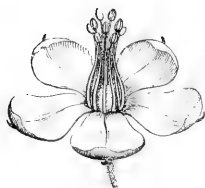


Fig. 24. Flower (3/4).

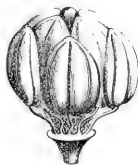


Fig. 26. Bud without perianth (3/4).

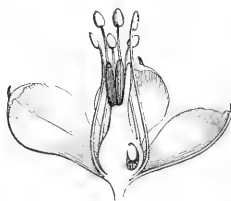


Fig. 25. Long. sect. of flower.

Beside *Balbisia* is placed *Wendtia*,<sup>2</sup> consisting of plants of the same country, mainly distinguished by having in each of its ovary cells, reduced to three, but two descendent ovules with micropyle

<sup>1</sup> The species, probably the only one, but very variable as to the thickness and the state of the surface of the leaves, is *B. verticillata* Cav. *Iconed.* (ex DC.).—KL. in *Linnaea*, x. 431.—*B. pedunculata* Don, in *Edinb. New Phil. Journ.* (1832), 277.—*B. Meyeniana* KL.—*Oenothera scoparia*, R. et Pav. *Herb.*!—*Ledocarpum chilense* Desf. *loc. cit.*—*L. pedunculata* Lindl. in *Bot. Reg.* t. 139.—*L. cistiflorum* Meyen, *Reis.* i. 470.

*L. Meyenianum* Walp. *Rep.* i. 460; v. 280.—*L. argenteum* Presl.—*Cruckhanksia cistiflora* Hook. *loc. cit.*

<sup>2</sup> MEYEN, *Reis.* i. 307.—KL. in *Linnaea*, x. 432.—ENDL. *Gen.* n. 6051.—B. II. *Gen.* 275, n. 12.—II. BN. in *Payer Fam. Nat.* 398.—*Martiniera* Guillem. in *Deless. Ic. Sc.* iii. 23, t. 40.—*Hyperum* Presl, *Epim. Bot.* 211.



turned outwards and upwards;<sup>1</sup> *Rhynchotheca*<sup>2</sup> (fig. 23-27), consisting of shrubs from the Andes of South America, having an ovary with five cells, biovulate, like those of *Wendtia*, but with apetalous flowers;<sup>3</sup> and *Viviania*<sup>4</sup> (fig. 28-30), consisting of herbaceous or

*Viviania rosea*.



Fig. 28. Bud.

Fig. 30. Long. sect. of flower ( $\frac{3}{4}$ ). Fig. 29. Bud, without calyx.

frutescent plants from the same countries,<sup>5</sup> of which the type of a distinct family has been made having regular flowers, with polypetalous corolla, contorted as in *Balbisia*, whose petals however are valvate instead of being imbricate, the gynæceum being, like that of *Wendtia*, reduced to three. Sometimes there are only two biovulate cells; the fruit being a loculicidal capsule with two or three panels. The floral receptacle bears here, as in *Geranium*, some alternipetalous glands.

<sup>1</sup> One species only, *W. gracilis* MEX. loc. cit.—*W. Pappigiana* KL. in *Linnaea* x, 432.—*W. Reynoldsii* ENDL. mss.—WALP. *Rep.* v, 330.—*Larrea* ? *trigyna* KZE. in *Pæpp. Coll. Pl. Chil.* iii, 129.—*Ledocarpum Reynoldsii* HOOK. *Icon.* t. 14.—*Martineria potentilloides* GUILLEM. loc. cit.

<sup>2</sup> R. et PAV. *Prodr. Fl. Per.* 142, t. 15.—DC. *Prodr.* i, 637.—ENDL. *Gen.* n. 6049.—B. H. *Gen.* 275 n. 11.—H. BN. in *Payer Fam. Nat.* 398.—*Aulacostigma* TURCZ. in *Bull. Mosc.* (1874), i, 149.

<sup>3</sup> Probably only one species but very variable, *R. spinosa* R. et PAV. *Fl. Per.* 142.—C. GAY, *Fl. Chil.* i.—*R. integrifolia* H. B. K. *Nov. Gen. et Spec.* v, 232, t. 464.—*R. diversifolia* H. B. K.

loc. cit. t. 465.—*Aulacostigma inerme* TURCZ. loc. cit. 150. WALP. *Ann.* i, 141.

<sup>4</sup> CAY. in *Ann. Scienc. Nat.* vii, 240, t. 9.—DON, in *Edinb. New Phil. Journ.* viii, 170.—KL. in *Linnaea*, x, 343.—ENDL. *Gen.* n. 6053.—B. H. *Gen.* 275, n. 10.—H. BN. in *Payer Fam. Nat.* 401.—*Macraea* LINDL. in *Brand. Quartel. Journ.* xxv, 104.—*Xeropetalon* HOOK. mss. (ex ENDL.).—*Casarca* CAMBESS. in *Mém. Mus.* xviii, 373, t. 18.—KL. in *Linnaea*, x, 435.—ENDL. *Gen.* n. 6052.—*Cissarobryon* PÆPP. *Fragm. Syn. Fl. Chil.* 29.—*Linostigma* KL. in *Linnaea*, x, 438.

<sup>5</sup> Seven or eight species, DELESS. *lc. sel.* iii, t. 41.—HOOK. *Bot. Misc.* iii, 148.—C. GAY, *Fl. Chil.* i, 396, t. 11, 12.

## V. NASTURTIIUM SERIES.

The flowers of the Nasturtiums<sup>1</sup> (fig. 31-39) are hermaphrodite and irregular. They have a concave receptacle, in the form of a porringer, the posterior part being prolonged into a spur of variable

*Tropaeolum majus.*



Fig. 31. Floriferous branch.

form and size<sup>2</sup>. Upon the edges of the cup are inserted five sepals<sup>3</sup>, quineuncially imbricate or valvate in the bud (sepal 2 being posterior and corresponding to the spur). The petals are often the same in

<sup>1</sup> L. *Gen.* n. 466.—J. *Gen.* 269; in *Mém. Mus.* v. 230.—LAMK. *Dict.* i. 610; Suppl. ii. 86; *Ill.* t. 277.—TURP. in *Dict. Sc. Nat.* Atl. t. 133.—DC. *Prodr.* i. 683.—SPACH, *Suit.* à Buffon iii. 4.—ENDL. *Gen.* n. 6063.—PAYER, *Organog.* 77, t. 16.—CHAT. in *Ann. Sc. Nat.* sér. 4, v. 283.—H. BN. in *Payer Fam. Nat.* 403.—B. H. *Gen.* 274, n. 7.—SCHNIZL. *Iconogr.* t. 258.—LEM. et DCNE. *Tr. Gén.* 353 (incl.: *Anisocentra* DON, *Chymocarpus* DON, *Magallana*

COMMERS.).—*Cardaminum* T. *Inst.* 430, t. 224.—ADANS. *Fam. des Pl.* ii. 338.—*Acriviola* BOERH. (ex ADANS.).

<sup>2</sup> It is free, sometimes wide and not very deep, sometimes very large, straight or curved, glandular at the bottom; so that the cavity often contains a sweet nectar. It is sometimes wanting in some cultivated flowers; in other cases it is more or less deeply lined.

<sup>3</sup> Often petaloid, coloured.

number as the sepals, with which they alternate, imbricate in the bud and dissimilar, the posterior being larger than the anterior, which they cover, the latter sometimes becoming very small or even in some species being entirely wanting. The androecium is formed

*Tropæolum majus.*



Fig. 34. Long. sect. of flower.



Fig. 32. Calyx.



Fig. 35. Gynæceum.



Fig. 36. Fruit.



Fig. 33. Diagram.



Fig. 37. Long. sect. of ripe carpel.

of two verticils each of four stamens. In that where the parts are alternipetalous, it is the stamen superposed to the spur which is wanting, it being the anterior one in the verticil of oppositipetalous stamens. All are, however, formed of a free filament and two-celled anther, dehiscing by two lateral or interior clefts.<sup>1</sup> The gynæceum is free, formed of a three-celled ovary, surmounted by a style whose summit is divided into three equal or unequal branches, bearing

<sup>1</sup> The pollen is according to H. MOHL (in *Ann. Sc. Nat.* sér. 2, iii. 337), formed of "triangular prisms with prickles, lateral rounded, or

suppressed on account of the furrows found on them, in water ellipsoidal, flattened, triangular at the middle with three short bands: *T. Majus*.

above and within stigmatic papillæ. In each ovary cell, of which one is posterior and the other two anterior, there is in the internal angle a single descendent anatropous ovule, with micropyle directed upwards and outwards.<sup>1</sup> The fruit is formed of three achenes, which are detached from the central axis at maturity presenting a dry,

*Tropæolum (Chymocarpus) pentaphyllum.*



Fig. 38. Flower.



Fig. 39. Long. sect.  
of flower.

sometimes very thick, more or less spongy indehiscent monospermous pericarp. Under the coats of the seed is contained a fleshy embryo, the thick plano-convex cotyledons surrounding by their base a short superior radicle. In some Nasturtiums of which the genus *Chymocarpus*<sup>2</sup> has been made (fig. 38, 39), the anterior petals are wanting or but little developed, and the fruit is more fleshy than in the other species. This genus contains some thirty species,<sup>3</sup> all herbaceous, sometimes climbing, fleshy, sapid, with alternate, petiolate, peltate or palmate leaves, angular, lobed or dissected, exstipulate or more rarely accompanied by small setiform or dissected stipules. The flowers<sup>4</sup> are axillary, solitary or pedunculate. All are natives of South America, especially of the temperate regions.

<sup>1</sup> It has two coats. Upon the phenomena of fecundation in the Nasturtiums; upon their embryonal sac, and the curious tubular *diverticulum en cul de sac* which this emits across the ovule, on its back and a little below and outside the micropyle, see: SCHLEIDEN, in *Nov. Act. Nat. Cur.* xix. 54, t. 8.—SCHACHT, in *Ann. Sc. Nat.* sér. 4, iv. 47.—WILSON, in *Hook. Lond. Journ.* ii. 623.—GIR. in *Trans. Linn. Soc.* xix. 161.—A. DICKSON, in *Edinb. New Phil. Journ.* xv. (1863), t. 4.

<sup>2</sup> DON, in *Trans. Linn. Soc.* xvii. 13, 145.—SCHLEID. in *Nov. Act. Nat. Cur.* xix. 56, t. 8, fig. 126.—ENDL. *Gen.* n. 6062.—H. BN. *Payer Fam. Nat.* 403.—*Mayallana* CAV. *Icon.* t. 344

(excl. fruct.).—DC. *Prodr.* i. 684.—ENDL. *Gen.* n. 6064.

<sup>3</sup> CAV. *Icon.* t. 395.—JACQ. *Hort. Schænbr.* t. 98.—R. et PAV. *Fl. Per.* iii. t. 313, 314.—PERS. *Enchirid.* i. 405.—A. S. H. *Pl. Us. Bras.* t. 41, 43; *Fl. Bras. Mer.* i. 95.—PEPP. et ENDL. *Nov. Gen. et Spec.* i. t. 35–38.—LINK. *KL.* et OTT. *IC. Fl. Rar.* t. 17.—ANDR. in *Bot. Repos.* t. 617, 635.—C. GAY, *Fl. Chil.* i. 407.—KARST. *Fl. Columb.* i. 145, t. 72.—*Bot. Mag.* t. 23, 98, 3169, 3190, 3844, 3851, 3985, 4042, 4097, 4245, 4323, 4337, 4385.—WALP. *Rep.* i. 465; ii. 820; v. 381; *Ann.* i. 142; ii. 237; iv. 397; vii. 492.

<sup>4</sup> Yellow, red, purple or bluish.

## VI. BALSAM SERIES.

The Balsams<sup>1</sup> (fig. 40-49) have irregular hermaphrodite flowers, with convex receptacle. The calyx is formed of five petaloid imbricated sepals, viz. one posterior, very large, prolonged behind

*Impatiens Balsamina.*



Fig. 40. Flower-bearing and fruit-bearing stem.

above its base into a spur of variable form and size; two lateral, smaller flat and covering the posterior; finally two anterior, very small or often altogether wanting. There are five petals, the anterior covering the others in the bud, and two lateral covered in prefloration by the two posterior.

<sup>1</sup> *Impatiens* L. *Gen.* n. 1908.—J. in *Ann. Mus.* v. 232.—LAMK. *Diet.* i. 363; Suppl. i. 569; *Ill.* t. 725.—K. in *Mém. Soc. List. Nat. par.* iii. 387.—RUP. *De fl. et aff. Balsam.* Basil. (1830).—AG. in *Sc. Nat.* sér. 2, ii. 44.—DC. in *Mém. Soc. Phys. Gen.* v. t. 1.—SPACH, *Suit à Buffon*, xiii. 271.—TURP. in *Diet. Sc. Nat. Atl.* t. 134.—ENDL. *Gen.* n. 6060.—LINDL. *Veg. Kingd.* 490,

fig. 337.—PAYER, *Organog.* 81, t. 17.—A. GRAY *Gen. Ill.* t. 152.—H. BN. in *Payer Fam. Nat.* 402.—B. H. *Gen.* 277, 989, n. 19.—SCHNIZL. *Iconogr.* t. 257.—LEM. et DCNE. *Tr. Gén.* 352.—*Balsamina* GÆRTN. *Fruct.* ii. 151, t. 113.—T. *Inst.* t. 235.—ADANS. *Fam. des. Pl.* ii. 432.—RIV. *Tetrap. Irr.* iv. 146.—J. *Gen.* 270.—DC. *Prodr.* i. 685.

These four latter are not entirely free, each of the lateral being more or less connate with the posterior which envelops it, so



Fig. 41. Posterior side of flower.

*Impatiens Balsamina.*



Fig. 48. Dehiscent fruit.



Fig. 42. Side view of flower.



Fig. 44. Longit. sect. of flower.

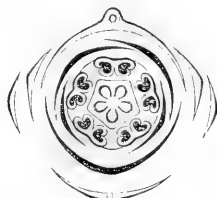


Fig. 43. Diagram.



Fig. 47. Fruit.

that these four appendices may only represent two, more or less deeply bilobate. The androecium consists of five alternipetalous hypogynous stamens, each formed of a short wide flat free filament, and a two-celled introrse anther adhering to the neighbouring anthers even at the time when the pollen is emitted,<sup>1</sup> which takes place by two short clefts of variable extent. The inner surface of the filaments is often prolonged into a kind of accessory collarette applied to the ovary. The ovary is free, superior, formed of five oppositipetalous cells, surmounted by a style with stig-

*Impatiens Balsamina.*



Fig. 45. Androecium and Gynæceum



Fig. 46. Longit. sect. of Androecium and Gynæceum.

<sup>1</sup> "Cylindrical, slightly compressed on two sides, rounded at the extremity; umbilicus trans-

versely oval, as much to the upper as the lower part of each of the small sides (thus four in all).

matiferous apex, divided into five more or less distinct lobes. In the inner angle of each cell is an indefinite number of descendent anatropous ovules, with superior and exterior micropyle<sup>1</sup>. The fruit is a loculicidal capsule, the five elongated panels separating from the axis and coiling elastically in a variable manner (fig 48-49) to cast the seeds, formed of coats containing a large fleshy exalbuminous embryo, with plano-convex cotyledons. In *I. natans*,<sup>2</sup> a succulent species from the marshes of central Asia, distinguished under the generic name of *Hydrocera*,<sup>3</sup> the fruit is more or less fleshy and indehiscent; and in that way this species is to the Balsams what *Chymocarpus* is to the Nasturtiums proper (page 16). Thus constituted this genus contains about a hundred and thirty species,<sup>4</sup> mostly natives of the warmest regions of the Old World; we meet, however, with a couple in North America and two or three in Northern Europe and Asia. They are herbs, sometimes suffrutescent, glabrous or covered with hairs, with alternate or opposite leaves, exstipulate, with a petiole often glandular at the base. The flowers are solitary or in cymes in the axil of the leaves or of the bracts which sometimes replace them at the summits of the branches. They are accompanied by two lateral bractlets, and their weight often draws them to the summit of the bent down peduncle, while their spur at first posterior may become anterior or lateral.

*Impatiens Noli-tangere.*



Fig. 49. Dehiscent fruit.

1. *Balsamina*, 1. *Nolitangere*." (H. MOHL, in *Ann. Sc. Nat.* sér. 2, iii. 342.)

<sup>1</sup> With double coat.

<sup>2</sup> W. *Spec.* i. 1175.—DC. *Prodr.* i. 687, n. 1.

<sup>3</sup> BL. *Bijdr.* 241; in *Ann. Sc. Nat.* sér 2, ii. 90.—ENDL. *Gen.* n. 6061.—B. H. *Gen.* 278, n. 20.

<sup>4</sup> HOOK. *Exot. Fl.* t. 137, 141, 146.—REICHB. *IC. Fl. Germ.* v. t. 198 b.—WIGHT et ARN. *Prodr.* i. 135, 140 (*Hydrocera*).—LEDEB. *Icon.* t. 89. WALL. *Pl. As. Rar.* t. 19, 193, 194.—WIGHT

*Icon.* t. 723, 741, 751, 950-970 bis, 1049, 1050, 1602, 1603.—HOOK. F. et THOMS. in *Journ. Linn. Soc.* iv. 106, 156 (*Hydrocera*).—HARV. et SOND. *Fl. Cay.* i. 312.—OLIV. *Fl. Trop. Afr.* i. 298.—BOISS. *Fl. Or.* i. 367.—BENTH. *Fl. Hongk.* 55.—A. GRAY *Man.* ed. 5, 108.—CHAPM. *Fl. S. Unit. St.* 65.—C. GAY, *Fl. Chil.* i. 466.—GREN. et GODR. *Fl. de Fr.* i. 325.—*Bot. Mag.* t. 4404, 4615, 4623, 4631, 4662, 4704, 4739, etc.—WALP. *Rep.* i. 467, 476 (*Hydrocera*); ii. 821; v. 382; *Ann.*; i. 143; ii. 239 iv. 398; vii. 503.

## VII. FLÆRKEA SERIES.

The only species for a long time known as the genus *Flærkea*<sup>1</sup> has flowers in three or more rarely four parts; it is better to study another whose flowers are pentamerous, or exceptionally tetramerous,

*Flærkea (Limnanthes) Douglasii.*



Fig. 50. Floriferous branch.

which is often cultivated in gardens under the name of *Limnanthes*<sup>2</sup> *Douglasii*<sup>3</sup> (fig 50-54). The floral receptacle is surbased and bears a calyx of five valvate sepals and a regular corolla of five alternate

<sup>1</sup> *F. proserpinoides* W. in *New Schr. Ges. Nat. Fr. Berl.* iii. 448.—TORR. et GRAY *Fl. N. Amer.* i. 210.—R. BR. in *Lond. and Edinb. Phil. Mag.* (1833), ii. 70.—LINDL. in *Hook. Journ. of Bot.*; i. t. 1 (*Rosac.*).—ENDL. *Gen.* n. 6065.—A. GRAY, *Gen. Ill.* t. 154; *Man.* ed. 5, 108.—B. H. *Gen.* 275, n. 9.—H. BN. in *Adansonia* x. 362.—WALP. *Rep.* i. 467.—*F. uliginosa* MUELH. *Cat.*

36.—*F. lacustris* PERS. *Enchirid.* i. 393.—*F. palustris* NUTT. *Gen.* i. 228.—*Nectris pinnata* PURSH, *Fl. Bor.-Amer.* i. 239.

<sup>2</sup> R. BR. in *Lond. and Edinb. Phil. Mag.* loc. cit. (1833).—ENDL. *Gen.* n. 6066.—PAYER, *Organog.* 51, t. 10.—B. H. *Gen.* 374, n. 8.

<sup>3</sup> R. BR. loc. cit.—LINDL. in *Bot. Reg.* t. 1673.—*Bot. Mag.* t. 3554.



petals with short claw contorted in præfloration. The androecium is formed of two verticils of five hypogynous free stamens. Those superposed to the sepals have a longer filament furnished outside its base with a short glandular scale. The anthers are two-celled, introrse,

*Flerkea (Limnanthes) Douglasii.*



Fig. 53. Ripe carpel ( $\frac{3}{4}$ ). Fig. 52. Long. sect. of flower ( $\frac{3}{4}$ ). Fig. 54. Long. sect. of carpel.

dehiscing by two longitudinal clefts, reflexed and definitely extrorse after anthesis. The gynæceum is formed of five alternipetalous carpels, with free unilocular ovary containing close to the base an ascendent anatropous ovule with micropyle turned downwards and outwards.<sup>1</sup> From the base of the internal angle of each ovary springs a gynobasic style, which unites with the four others in an erect tube, only becoming free a little below the apex which is swollen to a stigmatiferous head. The fruit, accompanied by the persistent calyx, is formed of five achenes,<sup>2</sup> with rugose exterior surface (fig. 53) each containing an ascendent seed whose coats cover a fleshy exalbuminous embryo, with short inferior radicle, hidden by the base of the cotyledons (fig. 54).

*Flerkea (Limnanthes) Douglasii.*



Fig. 51. Diagram.

The *Flerkea* proper only differ, as we have seen, from those of the section *Limnanthes* by the smaller number of their flower parts. We cannot on this account alone make of them more than one genus, which,

<sup>1</sup> It has two distinct coats.

<sup>2</sup> Slightly drupaceous at first.

thus formed, contains three or four herbaceous species<sup>1</sup> natives of the Western districts of North America, principally California. The leaves are alternate, exstipulate, pinnatisect, glabrous, like the whole plant, and the flowers<sup>2</sup> are axillary and solitary. By the complete independence of the carpels these plants are to the series which follow, nearly what the *Biebersteineæ* with independent carpels are to the *Geraniums*.

### SORREL SERIES (FR., *Surelle*)

In the Sorrels<sup>3</sup> (fig. 55-68) the flowers are regular and herma-

*Oxalis crenata*.

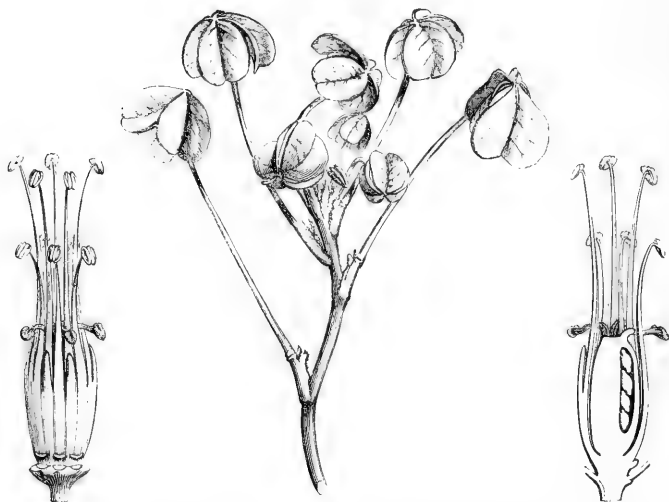


Fig. 56. Flower without perianth. ( $\frac{1}{2}$ ). Fig. 55. Foliaceous branch. Fig. 57. Long. sect. of flower.

phrodite, with a convex receptacle. The calyx is composed of five

<sup>1</sup> ENDL. *Atakt.* t. 27.—DON, in *Sweet Fl. Gard.* ii. t. 378.—BENTH. in *Hort. Trans.* ser. i. 409.—LINDL. in *Journ. Hort. Soc.* iv. 78.—V. HOUTTE *Fl. des Serres*, v. 4316.—WALP. *Rep.* i.

467; *Ann.* ii. 239.

<sup>2</sup> White, tinted with yellow towards the claws, or pink.

<sup>3</sup> *Oxalis* L. *Gen.* n. 582.—J. *Gen.* 270; in

sepals,<sup>1</sup> disposed in the bud in quincuncial præfloration, and the corolla of five alternate free<sup>2</sup> petals, contorted in præfloration. The androecium is formed of ten stamens with two-celled introrse<sup>3</sup> anthers dehiscing by two longitudinal clefts.<sup>4</sup> Their filaments are free or

*Oxalis Acetosella.*



Fig. 58. Bud ( $\frac{2}{1}$ ).



Fig. 59. Diagram.



Fig. 60. Dehiscent fruit ( $\frac{3}{4}$ ).



Fig. 61. Seed, the outer coat detached.



Fig. 62. Seed, outer coat removed.



Fig. 63. Long. sect. of seed, outer coat removed.

united among themselves below. Those of the alternipetalous stamens<sup>5</sup> are longer than the five others, and their filaments bear outside a tongue of variable length. The gynæceum is superior, formed of an ovary with five oppositipetalous cells, surmounted by a like number of style branches, swollen to a bifid or lacinate stigmatiferous head at the apex.

*Mém. Mus.* v. 230.—GERTN. *Funct.* ii. 252, t. 113.—LAMK. *Ill.* t. 391; *Diet.* iv. 675; Suppl. iv. 237.—TURP. in *Diet. Sc. Nat.* Atl. t. 132.—DC. *Prodr.* i. 690.—SPACH, *Suit. à Buffon*, iii. 237.—LINDL. *Veg. Kingd.* 488, fig. 336.—ENDL. *Gen.* n. 6058.—PAYER, *Organog.* 54, t. 11.—A. GRAY *Gen. Ill.* t. 144.—B. H. *Gen.* 276, 989, n. 15.—H. BN. in *Payer Fam. Nat.* 398.—LEM. et DCNE. *Tr. Gén.* 357.—Oxys T. *Inst.* 88, t. 19.—ADANS. *Fam. des Pl.* ii. 388.—*Biophytum* DC. *Prodr.* i. 689.—SPACH, *loc. cit.* 268.

<sup>1</sup> Some or all of them often bear two or several collateral yellow spots near each other at the summit, like the "glands" of cauline leaves, and presenting a strange modification of tissue. They are perhaps analogous to the anther cells in the stamen.

<sup>2</sup> The corolla however often falls in one piece, the petals remaining fastened together for a certain distance on account of a peculiarity of their edges similar to that observed in the *Linææ*. The petals often have the two edges a little unsymmetrical, the edge covering differing slightly from that covered, and sometimes differing in colour. The corolla often opens to the sun and closes again afterwards; it is generally very caducous like that of the *Flax*.

<sup>3</sup> When more or less oscillating their face may be turned outwards.

<sup>4</sup> The pollen is formed of ellipsoidal grains with three folds, or is ovoid with outer membrane divided into two semi-lunate bands. (H. MOHL. in *Ann. Sc. Nat.* sér. 2, iii. 335.)

<sup>5</sup> More or less interior to the five others.

In the inner angle of each cell is a placenta supporting one, two, or an indefinite number of descendent, anatropous ovules with exterior and superior micropyle, disposed at first in two vertical series<sup>1</sup>. The fruit, generally accompanied by the persistent calyx, is a loculicidal capsule, the pericarp remaining after dehiscence adhering to the axis of the fruit.<sup>2</sup>

*Oxalis violacea.*



Fig. 64. Habit.

By the clefts of dehiscence escape a very variable number of seeds containing, under their triple coat,<sup>3</sup> a fleshy albumen, the axis being occupied by a straight embryo. The outer coat, thick and fleshy,<sup>4</sup> opens at maturity (fig. 61) and separates from the inner parts of the seed elastically throwing them to a distance. This genus contains at least two hundred species,<sup>5</sup> natives especially of South Africa and the tropical and temperate regions of South America. There are some half dozen species widely dispersed, some in the tropical, others in temperate regions of the whole world. They are herbs, undershrubs or shrubs of small size. The leaves

are alternate, petiolate, compound-pinnate or digitate, trifoliate or formed of a large number of articulate folioles,<sup>6</sup> entire or bilobate, more rarely reduced to a single foliole.

<sup>1</sup> They have two coats. The exostome is often prolonged into a more or less thick tube sometimes capped by an obturator.

<sup>2</sup> In *Biophytum* (fig. 67) the valves of the fruit always expand into the form of a star.

<sup>3</sup> The deep layer is membranous and whitish. The middle layer is thick, crustaceous, of dusky colour.

<sup>4</sup> Formed of whitish cellules or rarely of tracheal bundles.

<sup>5</sup> JACQ. *Oxalid. Mon.* Vindob. (1794), in-4. —REICHB. *Icon. Fl. Germ.* v. t. 199. —ZUCC. in *Denks. Ak. Münch.* ix. (1825), t. 1-6; in *Abh. Münch.* i. (1831), t. 1-3. —H. B. K. *Nov. Gen. et Spec.* v. t. 466-471. —A. S. H. *Pl. Us. Bras.* i. 104, t. 43-45; *Fl. Bras. Mer.* i. 104, t. 21-25. —C. GAY, *Fl. Chil.* i. 122. —GRISEB. *Cat. Pl.* 2 *Cub.*

47; *Fl. Brit. W. Ind.* 133. —A. GRAY *Man.* ed. 5, 109. —CHAPM. *Fl. S. Unit. St.* 63. —HOOK. *F. Fl. N. Z.* t. 13; *Man.* 38. —BENTH. *Fl. Austral.* i. 300; *Fl. Hongkong.* 56. —WIGHT, *Icon.* t. 18; *Ill.* t. 62 (*Biophytum*). —THW. *Enum. Pl. Zeyl.* 64, 409. —BOISS. *Fl. Or.* i. 866. —OLIV. *Fl. Trop. Afr.*; i. 295. —HARV. et SOND. *Fl. Cap.*; i. 313. —GREN. et GODR. *Fl. de Fr.* i. 325. —Bot. *Mag.* t. 155, 237, 4490, etc. —WALP. *Rep.* i. 476; ii. 821; v. 383; *Ann.* i. 147; ii. 240; iv. 399; vii. 495.

<sup>6</sup> It is one of the differences between the true *Oxalis* and *Biophytum* that the leaves of the latter are paripinnate, with numerous folioles, articulated and endowed with gentle movements under the influence of light, darkness, shocks; in fact, nearly the same conditions as in *Mimosa*.

In this case the petiole may be dilated into a phyllodium at the summit of which the limb may be reduced to a very small size or

*Oxalis purpurata.*

Fig. 65. Habit.

*Oxalis articulata.*

Fig. 66. Habit.

even disappear altogether. But what is more variable in this genus is the organization and form of the stem. This is sometimes aerial, cylindrical, and woody or herbaceous. Elsewhere it consists of a rhizome more or less swollen and fleshy in the cortical parts (fig. 64, 65), its evolutions presenting pretty numerous variations. It may become a reservoir of sap and present a cylindrical form, thick, or nearly globular, resembling a full bulb (fig. 68) like one or several roots which then take the form of conical taproots and certain buds, sometimes terminal sometimes axillary fig. (64, 65). These buds, becoming quite fleshy and covered with scars, may appear like tubers of the Potato (fig. 68), and in this case especially they become edible. The flowers<sup>1</sup> are axillary, solitary

*Oxalis (Biophytum) sensitiva.*

Fig. 67. Deliscent fruit.

Sleep-phenomena have been noticed in a great number of species of *Oxalis* with plurifoliate leaves (fig. 55).

<sup>1</sup> White yellow, pink, purple, or diverse coloured, or shaded.

or united at the summit of a common stem in one or several uniparous cymes, similar to umbels, like those of the Geraniums.<sup>1</sup>

*Oxalis Andrieuxii.*



Fig. 68. Habit.

*Hypsococharis pimpinellifolia*,<sup>2</sup> a small perennial herb of the Bolivian Andes, is to *Oxalis* what *Monsonia* is to the Geraniums, the flowers<sup>3</sup> having fifteen stamens instead of ten. Rather small and not numerous glands are placed on a level with the insertion of the petals and androecium. The ovary has five oppositipetalous multi-ovulate cells. The leaves of this plant are alternate and imparipinnate. The flowers<sup>4</sup> are in scorpioid cymes at the summit of a common stem.

*Carambola* has the flower of *Oxalis*. In one of the two species known, *Averrhoa Bilimbi*,<sup>5</sup> the ten stamens are fertile and five only among them alternipetalous in the true species of *Carambola*.<sup>6</sup> These

are Asiatic trees, with pinnate leaves, and the fruit is a pentagonal berry. The fruit is also fleshy although small in the trees from tropical Asia of which the genus *Connaropsis*<sup>7</sup> is made, and which when better known will doubtless be rejoined to the genus *Averrhoa*.

<sup>1</sup> Several species have two sorts of flowers: those with no corolla or one but little developed being late, slow, and producing fruit rather than those whose petals are well developed and which are sometimes quite sterile. (See H. Bn. in *Adansonia*, vii, 97.)

<sup>2</sup> REMY, in *Ann. Sc. Nat.* sér. 3, viii, 238. —WEDD. *Chlor. andin.* ii, 289, t. 81.—B. H. Gen. 276, n. 14.—H. Bn. in *Adansonia*, x, 362.

<sup>3</sup> White with yellow claw.

<sup>4</sup> *Averrhoa* L. Gen. 577.—J. Gen. 375.—LAMK. *Diet.* i, 619; Suppl. ii, 90; *Ill.* t. 385. —CORR. in *Ann. Mus.* viii, 71, t. 2.—DC. *Prodr.* i, 689.—SPACH, *Suit à Buffon*, iii, 234.—ENDL.

Gen. n. 6059.—B. H. Gen. 277, n. 16.—H. Bn. in *Payer Fam. Nat.* 399.

<sup>5</sup> L. Spec. 613.—CAV. Diss. t. 220.—*Blimbingum teres* RUMPH. *Herb. Amboin.* i, 119, t. 36.—BUCH. Dec. iii, t. 6.—*Malus indica fructu 5-gono Bilimbi dicto* (RAY, *Hist.* 1449).

<sup>6</sup> *A. Carambola* L. loc. cit.—CAV. Diss. t. 220.—*Prunum stellatum* RUMPH. *Herb. Amboin.* i, 118, t. 35.—BUCH. Dec. x, t. 3.—*Malus indica fructu acido flavo 5-gono sulcato* (HERM.).

<sup>7</sup> PL. ex HOOK. f. in *Trans. Linn. Soc.* xxiii, 166.—B. H. Gen. 277, n. 17.—H. Bn. in *Adansonia*, x, 361.—WALP. *Ann.* vii, 502 (3 esp.).

They form in this case a section characterised by leaves reduced to three or to one single foliole.<sup>1</sup>

*Geranium* and the neighbouring genera, after having been generally connected with the Mallows, became before the middle of the eighteenth century<sup>2</sup> the type of a separate group. B. DE JUSSIEU,<sup>3</sup> in 1759, and ADANSON, in 1763, each established an order *Gerania*; but the former very improperly by placing beside *Geranium* and *Oxalis*, *Malpighia* and two neighbouring genera, the *Sapindaceæ* known in his time, the Vines, *Menispermææ*, Passion flowers, and *Mulvaceæ*: *Bombax* and *Hermannia*. ADANSON<sup>4</sup> much improved the family by removing the *Menispermææ*, *Pussifloreæ*, *Bombaceæ*, and *Amphélidææ*, but he introduced the Nasturtiums, *Melanthus*, and *Viola*. In 1789, A. L. DE JUSSIEU<sup>5</sup> only left in the *Geranium* order *Geranium* and *Monsonia*, and as genera affinia, *Tropæolum*, *Balsamina*, and *Oxalis*, which he again unfortunately separated in 1817.<sup>6</sup> The *Neuradææ*, whose close affinities with the Geraniums had been known to most botanists, had unfortunately, until quite recent times, been placed in the order *Rosaceæ*.<sup>7</sup> *Biebersteinia*, considered as *Rutaceæ*,<sup>8</sup> were in, 1862, placed by BENTHAM and HOOKER<sup>9</sup> among the *Geraniææ*. The same authors reintroduced the *Balsamineæ*, *Tropæoleæ*, and *Oxalidææ*, in the *Geraniaceæ* family, as well as *Flacukeæ*, and *Limnanthes*, before considered as a distinct family. The *Bulbisiææ* and *Vivianiææ*, from the time they were first known, have been considered as very analogous to the *Oxalidææ*.<sup>10</sup>

As actually now constituted the family comprises eighteen genera, divided into eight series whose general characters are the following:

<sup>1</sup> Le *Drypania racemosa* (KORTH. in *Ned. Kruidk. Arch.* (1854), 381.—PL. in *Ann. Sc. Nat. sér. 4. ii.* 266.—Miq. *Fl. Ind. Bat. Suppl.* i. 398.—B. H. *Gen.* 277, n. 18), a plant from Sumatra, which, according to its described characters, is nearly allied to *Averrhoa*, but distinguished from it by its simple leaves and ovary cells ("carpella subcoalita"). It has also been doubtfully allied to the *Quassiceæ* (*Sinuarbuceæ*).

<sup>2</sup> LINNÆUS, in 1738, in *Classes Plant. ranges*

*Geranium* with certain *Sapindaceæ*, etc. in his Order 50, *Trihilatæ*.

<sup>3</sup> Ex A. L. Juss. *Gen.* lxxvii.

<sup>4</sup> *Fam. des Pl.* ii. 388, *Fam.* 49.

<sup>5</sup> *Gen.* 268, *Ord.* 13.

<sup>6</sup> In *Mém. Mus.* v. 230, 232.

<sup>7</sup> *Voy.* p. 10, note 2.—H. Bk. in *Adansonia*, x. 361.

<sup>8</sup> LINDL. *Veg. Kingd.* 469.

<sup>9</sup> *Gen.* 270, 271.

<sup>10</sup> Juss. in *Mém. Mus.* v. 231.

1. BIEBERSTEINÆ.<sup>1</sup>—Flowers regular, hermaphrodite, diplostemonous, with convex receptacle. Carpels oppositipetalous, independent, indehiscent. Ovules solitary.—1 genus.

2. GERANIÆ.<sup>2</sup>—Flowers regular or irregular (with spur not free), and convex receptacle. Carpels oppositipetalous, united in a plurilocular ovary, with geminate ovules. Fruit rostrate, in panels separating from central columella.—4 genera.

3. NEURADEÆ.<sup>3</sup>—Flowers regular, with concave receptacle. Ovules solitary. Carpels 5–10, dehiscing at the apex and lodged in the concavity of the persistent receptacle, dry.—2 genera.

4. BALBISIÆ.<sup>4</sup>—Flowers regular, with or without corolla, having a convex receptacle. Carpels alternipetalous, united in a plurilocular ovary. Ovules 2–∞. Fruit loculicidal or septifragal.—4 genera.

5. TROPÆOLÆ.<sup>5</sup>—Flowers irregular, with concave receptacle, prolonged at the back into a free spur. Stamens perigynous, disposed in fours in two verticils. Carpels 3, uniovulate, indehiscent, separating from the columella at maturity.—1 genus.

6. BALSAMINÆ.<sup>6</sup>—Flowers irregular, with convex receptacle. Posterior sepal prolonged into a free spur. Stamens 5, hypogynous. Carpels 5, united into a plurilocular ovary. Cells pluriovulate. Fruit capsular, with elastic dehiscence, or fleshy, indehiscent.—1 genus.

7. FLERKEÆ.<sup>7</sup>—Flowers regular, 3–5-merous, with plano-convex receptacle. Carpels free in the flower and fruit, with gynobasic style. Ovules solitary, ascendent.—1 genus.

8. OXALIDÆ.<sup>8</sup>—Flowers regular, di- or triplostemonous with

<sup>1</sup> ENDL. *Gen.* 1165 (*Gen. Zygophylleis* affn.).—*Ag. Theor. Syst.* 167 (*Rosac.*).

<sup>2</sup> *Geraniaceæ* DC. *Fl. Fr.* iv. (1805), 828 *Prodr.* i. 637, Ord. 46.—ENDL. *Gen.* 1166, Ord. 254.—LINDL. *Veg. Kingd.* 493, Ord. 187.—*Ag. Op. Cit.* 170.

<sup>3</sup> *Neuradææ* DC. *Prodr.* ii. 548 (*Rosac. trib.* 4).—ENDL. *Gen.* 1249 (*Rosac. subord.* 4).—LINDL. *Veg. Kingd.* 565 (*Rosac. trib. v. ?*).—*Ag. Op. Cit.* 288.

<sup>4</sup> H. BN. in *Payer Fam. Nat.* 397, Fam. 172.—*Ledocarpeæ* MEYEN, *Reis.* i. 307.—*Rhynchothecææ*, *Ledocarpeæ*, *Vivianiææ* (*Geran. affn.*) ENDL. *Gen.* 1169.—*Ag. Op. Cit.* 203.—*Oxalidaceæ* (part.) LINDL. *Veg. Kingd.* 489.—*Vivianiææ* Kt. in *Linnaea*, x. (1836), 433.—LIND. *op. cit.* 365, Ord. 128.—*Wendtiææ* B. H. *Gen.* 270, 275.

<sup>5</sup> J. in *Mém Mus.* iii. 447 (1817).—DC. *Prodr.* i. 683, Ord. 47.—ENDL. *Gen.* 1174, Ord. 258.—*Ag. op. cit.* 208.—*Tropæolaceæ* LINDL. *Veg. Kingd.* 366, Ord. 129.

<sup>6</sup> A. RICH. in *Diet. Hist. Nat.* ii. 173 (1822).—DC. *Prodr.* i. 685, Ord. 48.—ENDL. *Gen.* 1173, Ord. 257.—*Ag. op. cit.* 59. (*Eriotherææ* ?).—*Balsaminaceæ* LINDL. *Introd.* ed. 2, 138; *Veg. Kingd.* 490, Ord. 186.—*Hydrocerææ* BL. *Bijdr.* 241. (1825).

<sup>7</sup> *Limnantheæ* R. BR. in *Lond. and Edinb. Phil. Mag. and Journ.* (July, 1833).—ENDL. *Gen.* 1175, Ord. 269.—LINDL. *Veg. Kingd.* 367, *Tropæolac. trib.* 2.—*Ag. op. cit.* 57.—*Limnantheææ* LINDL. *Introd.* ed. 2, 142.

<sup>8</sup> DC. *Prodr.* i. (1824), 69, Ord. 489.—ENDL.



convex receptacle. Carpels united into an ovary with cells 2- $\infty$ -ovulate, oppositipetalous. Fruit capsular, loculicidal, or fleshy.—3 (or 4) genera.

We thus see that the most important characters for distinguishing the series or genera are drawn from the shape of the receptacle, the regular or irregular form of the flowers, the number of the stamens, the situation of the carpels with respect to the pieces of the perianth, their independence, or union, the organisation of the fruit, and the mode of dehiscence, the number and direction of the ovules and seeds. The other characters, which vary in the different genera, are: the mode of præfloration of the calyx, the presence or absence of petals, the number of fertile and sterile stamens, that of the ovary cells, the consistence of the pericarp, and the shape of the embryo.

It is in these characters we must find the closest affinities of the *Geraniaceæ*. On one side, by the *Biebersteinia*, they are nearly allied to the *Rutaceæ* and *Ochnaceæ*, scarcely distinguished among the former from the *Surianeæ* having two ovules in each carpel,<sup>1</sup> and the *Zygophylleæ*, having generally staminal filaments free and furnished with a basilar interior scale, like those of *Quassieæ*, a fruit with a different dehiscence and a lateral swollen inflorescence. On the other hand the *Geraniaceæ* are allied to the *Linaceæ*, from which we see they are scarcely separated in an entirely artificial manner.

The six hundred species or so<sup>2</sup> contained in this group are distributed so that there are about a sixth part in America. The other five-sixths belong to the old world.<sup>3</sup> All the *Balbisieæ*, some dozen in number, are natives of South America. It is the same with the *Nasturtiums*, *Flerkeæ*, and *Hypsoccharis*. On the contrary, *Averrhoa*, *Dapania*, and *Biebersteinia* (except one) are Asiatic. *Monsonia* is Asiatic, and especially African. *Pelargonium* is almost

*Gen.* 1171, *Ord.* 251.—*Oxalidaceæ* LINDL. *Introd.* ed. 2, 140; *Veg. Kingd.* 438, *Ord.* 185.

<sup>1</sup> *Voy. Adansonii*, x. 317, 360.

<sup>2</sup> Those of *Pelargonium* and *Oxalis* are often badly defined and will be doubtless further reduced; hence the difficulty of fixing the exact number.

<sup>3</sup> There are some common species of European

Geraniums which have followed man in certain parts of America, especially *G. Robertianum* (*voy. A. DC. Géogr. Bot.* 720). Certain species of *Impatiens*, as *I. fulva*, natives of America, have been naturalised in Europe. The European *Oxalis* with yellow flowers, like *O. corniculata* and *stricta*, exist for similar reasons in both worlds (*A. DC. op. cit.* 629, 660).

entirely plants of South Africa. We have seen, however, that some species belong to the East, to Northern Africa, and even to New Zealand and Australia. There are in all regions species of *Geranium*, *Erodium*, and *Impatiens*, but they are especially plants from the temperate regions of the old world.<sup>1</sup>

The properties<sup>2</sup> of the *Geraniaceæ* are tolerably varied, but they belong to two types. Some are odoriferous and aromatic, as *Geranium*, *Pelargonium*; others are acid or have a piquant sharpness like the *Crucifers*: such are *Tropæolum*, *Oxalis*, and *Flækea*. All are exciting, stimulating, warm, and consequently digestives, purgatives, aperients, antiscorbutics, etc. The essential volatile oil which renders them fragrant is not very abundant in the vegetative organs<sup>3</sup> of the *Geraniums* and *Erodiums* of the temperate regions; but its presence is manifest in the perfumed leaves of *E. moschatum*,<sup>4</sup> which are used in preparing exciting, digestive, diaphoretic infusions, and in those of the Cranesbills (Fr. *Bee-de-grue*<sup>5</sup>) belonging to *Geranium* (fig. 1, 12-14), and in *G. rotundifolia*<sup>6</sup> and *pratense*.<sup>7</sup> There is often a certain proportion of tannin which causes them to be employed as tonics, astringents, hemostatics, or vulneraries, *G. sanguineum* (fig. 8-11) *columbinum*, *pusillum*, *nodosum*, *carolinianum*, *mexicanum*, *Hernandezii*, *tuberosum*, etc., and *Erodium gruinum* and *cicutarium*.<sup>8</sup> These properties are much stronger still in *Geranium maculatum*,<sup>9</sup> or Alum-root of the United States, which is

<sup>1</sup> The *Erodiums* are perhaps not natives of America; there are certainly but few which can claim to be so. There are probably but two American species of *Impatiens*, while the old world has about thirty.

<sup>2</sup> ENDL. *Enchirid.* 621, 625, 626, 628.—GUIB. *Drog. Simpl.* éd. 6. iii. 567-572.—LINDL. *Fl. Med.* 221, 222.—ROSENTH. *Synops. Plant. Diaphor.* 888-892, 894-899.

<sup>3</sup> This essence is secreted by the capitate hairs which in the *Pelargonium Rosats* may be observed in unequal quantities on both surfaces of the leaves (and on other organs of vegetation). They are formed of several cellulæ placed end to end, separated by transverse partitions, and their head is spherical or nearly so.

<sup>4</sup> W. *Sylc.* iii. 631.—DC. *Prodr.* i. 647, n. 23.—ROSENTH. *op. cit.* 888 (*Herba Moschatæ* v. *Æcus moscatæ* off.).

<sup>5</sup> *Geranium Robertianum* L. *Spec.* 995.—DC. *Prodr.* i. 664, n. 63.—GREN. et GODR. *Fl. de Fr.* i. 307.—CAZIN, *Pl. Médic. Indig.* éd. 3, 477, t. 20. (*Herbe à Robert*, *Herbe à l'esquinancie*, *Pied-de-pigeon*, *Pied-de-colombe*, *Bee-de-cigogne*, *Patte-d'alouette*, *Persil maringonia*.)

<sup>6</sup> L. *Spec.* 957.—CAV. *Diss.* iv. t. 93, fig. 2.—GREN. et GODR. *Fl. de Fr.* i. 305.

<sup>7</sup> L. *Spec.* 954.—CAV. *Diss.* iv. t. 87, fig. 1.—DELAUN. *Herb. de l'anat.* t. 118 *Herba Geranii batrachiodis* off.).

<sup>8</sup> See ROSENTH. *op. cit.* 888-890.

<sup>9</sup> L. *Spec.* 955.—DILL. *Elth.* t. 132, fig. 159.—CAV. *Diss.* iv. t. 86, fig. 2.—BIGEL. *Amer. Med. Bot.* i. 84, t. 8.—DC. *Prodr.* i. 642, n. 38.—MER. et DEL. *Dict. Mat. Méd.* iii. 368.—LINDL. *Fl. Med.* 221.—BENTL. in *Pharm. Journ.* ser. 2, v. 20.—GUIB. *op. cit.* 570.—ROSENTH. *op. cit.* 899 (*Croufcat*).

used as a hemostatic and as a powerful remedy in diarrhœa and dysentery.<sup>1</sup> The species of *Monsonia* are used at the Cape as astringents,<sup>2</sup> as are also several of *Pelargonium*. At the Cape *P. antidysentericum*,<sup>3</sup> and *cucullatum*,<sup>4</sup> are recommended for nervous and intestinal affections. In India, *P. anceps*<sup>5</sup> is valued as an emmenagogue, and even as assisting parturition. In the last named genus the usually abundant essential oil renders several species very fragrant; at the Cape it is distilled largely for industrial purposes from the leaves of several species cultivated in large quantities for the purpose, and among others from *P. Radula*,<sup>6</sup> *roscum*,<sup>7</sup> *capitatum*,<sup>8</sup> and *odoratissimum*.<sup>9</sup> It is often used to adulterate Otto of Roses, resembling it in perfume, the species used being often named *Geranium Rosat*.<sup>10</sup> The waters distilled from these plants contain, like those from roses, a certain portion of astringent principle, they are therefore used topically for quinsy and slight ophthalmic affection, and when the tannin is more abundant some *Geraniæ* may be used in preparing leather; *Geranium sylvaticum*, *reflexum*, *macrorrhizum*, and *sanguineum* are so employed. *G. sylvaticum*, with sulphate of iron, is also used in dyeing black; *G. sanguineum*, *Robertianum*, and *Erodium moschatum* give a yellow dye, and the flowers of *G. molle*, a blue. The odour of several Geraniums is said to keep away parasites.<sup>11</sup> The perfume of the leaves of several *Pelargoniums* is strong and disagreeable, but some, and especially *P. triste*,<sup>12</sup> have flowers giving by night a grateful perfume. Some Geraniums have

<sup>1</sup> Richer it is said in tannin than kino; it is used as a powder, extract, and eye. The last is said to be a sovereign remedy for thrush and ulcers in the mouth. It is a good tonic for children troubled with affections of the digestive tube, and ought to be tried in Europe.

<sup>2</sup> Especially *M. ovata* Cav. Diss. iv. 193, t. 113, fig. 1.—DC. Prodr. i. 638, n. 4.—ROSENTH. op. cit. 891.—*M. emarginata* L'HER. Geraniol. t. 41.—*Geranium emarginatum* L. f. Suppl. 306.

<sup>3</sup> STEUD. ex ROSENTH. op. cit. 892.—*Jenkinsonia antidysenterica* ECKL. et ZEYH.

<sup>4</sup> AIT. Hort. Kew. ii. 426.—HARV. et SONDR. Fl. Cap. i. 302, n. 144.

<sup>5</sup> AIT. Hort. Kew. ii. 40.—JACQ. Collect. iv. 184, t. 22.—*Peristera anceps* ECKL. et ZEYH.

<sup>6</sup> AIT. Hort. Kew. ii. 423.—Cav. Diss. t. 101, fig. 1.—L'HER. Geraniol. t. 16.—ECKL. et ZEYH. Enum. 645.—HARV. et SONDR. Fl. Cap. n. 159.—*P. revolutum* JACQ. Icon. t. 133.

<sup>7</sup> AIT. Hort. Kew. ed. 2, iv. 161.—DC. Prodr.

i. 651, n. 31.—HARV. et SONDR. Fl. Cap. i. 268.—SWEET, Geran. t. 262.—ROSENTH. op. cit. 891.—*P. condensatum* PERS. Enchirid. ii. 227.—*Geranium roscum* ANDR. Bot. Rep. t. 173. A species now rare or considered lost in England.

<sup>8</sup> AIT. Hort. Kew. ii. 425.—DC. Prodr. i. 674.—Cav. Diss. t. 105, fig. 1.—HARV. et SONDR. Fl. Cap. n. 146. Often cultivated under the erroneous name of *P. roscum*. *P. vitifolium* AIT. perhaps is a simple variety of this species.

<sup>9</sup> AIT. Hort. Kew. ii. 419.—Cav. Diss. t. 103.—SWEET, Geran. t. 299.—HARV. et SONDR. Fl. Cap. n. 139.

<sup>10</sup> See GRUB. op. cit. iii. 571. The essence of *Andropogon* (Gramineæ), said to be from *Geranium*, must not be confounded with this.

<sup>11</sup> That of *G. purpureum* is said to prevent bugs.

<sup>12</sup> AIT. Hort. Kew. ii. 418.—DC. Prodr. i. 662.—HARV. et SONDR. Fl. Cap. i. 274.—Bot. Mag. t. 1641.—*P. millefolium* SWEET, Geran. t. 220.

swollen and succulent subterranean parts, which might serve for food. In Egypt the tubercules of *Erodium hirtum* are eaten; in Australia those of *Geranium parvifolium*;<sup>1</sup> at the Cape, the buds and acid leaves of *Pelargonium pellatum*<sup>2</sup> and *acetosum*.<sup>3</sup> But it is especially among the species of *Oxalis* that we find eatable leaves and tubercules. The subterranean and swollen stems of *O. tetraphylla* and *esculenta* are eaten like potatoes in Mexico; *O. Deppei* and *crassicauli* are sold in Peru as edible. The *Oca* of Peru, so often eaten as vegetables, and of which there are many varieties, are the tubercules of Chilian species, such as *O. crenata*, *tuberosa*, *carnosus*<sup>4</sup>, etc. Of many other species, the leaves which are acid like sorrel are eaten cooked or in salad; in France those of *O. Acetosella*<sup>5</sup> (fig. 58-63), and *corniculata*; at the Cape, those of *O. compressa*, *caprina*, and *zonata*, and in America those of *O. frutescens*, *Barrelieri*, and *enneaphylla*, etc., are so employed. When the leaves are very acid the plants are good for fever and scorbutic affections. In Mexico those of *O. cordata*, in Peru of *O. dodecandra*, and in Brazil, of *O. fulva*, are so used. In this case they contain more or less oxalic acid, and formerly salts of sorrel was extracted from *O. Acetosella*, *corniculata*<sup>6</sup> etc., and even now it is done in Switzerland and Germany. In India, *O. sensitiva*<sup>7</sup> (fig. 67) is said to cure asthma, consumption, and scorpion bites. This is one of the plants which popular credulity, excited by the singular movements and irritability of the leaves, has made a sort of fetish. Species of *Oxalis* may also contain colouring matter; in America *O. rosca* and *racemosa* do so.

—*P. multiradiatum* ECKL. et ZEYH.—*P. paucifolium* ECKL. et ZEYH.—*P. papaverifolium* ECKL. et ZEYH.—*Geranium triste* Cav. Diss. t. 107. The swollen stems are also edible.

<sup>1</sup> W. Enum. 716.—BENTH. *Fl. Austral.* i. 296. Var. (?) du *G. dissectum*. L. (*Native Carrot* in Van-Diemen).

<sup>2</sup> AIR. *Hort. Kew.* ii. 427.—CAV. *Diss.* t. 100. fig. 1.—*Bot. Mag.* t. 20.—*P. scutatum* DC. (*Geranium-Lierre*).

<sup>3</sup> AIR. *Hort. Kew.* ii. 430.—HARV. et SOND. *Fl. Cap.* i. 298. At the Cape the dried resinous and balsamic stems of *Mansonia Burmanni* (DC. *Prodr.* l. 638;—ENDL. *Enchirid.* 621;—*Sarcocaulon Burmanni* HARV. et SOND. *Fl. Cap.* i. 256;—*Geranium spinosum* CAV. *Diss.* t. 75, fig. 2), used frequently to make torches.

<sup>4</sup> See ENDL. *Enchirid.* 625. GUIN. *op. cit.* iii. 568.—ROSENTH. *op. cit.* 896.

<sup>5</sup> L. *Spec.* 620.—JACQ. *Oxal.* n. 91, t. 80, fig. 1.—DC. *Prodr.* i. 700, n. 123.—GREN. et GODR. *Fl. de Fr.* i. 325.—GUIN. *op. cit.* iii. 567, fig. 731.—LINDL. *Fl. Méd.* 222.—REV. *Fl. Méd.* du xix. Siècle iii. 366, t. 4).—CAZ. *Tr. des Plant. Méd.* Ind. éd 3, 50. *Surette, Surelle, Alleluia, Herbe de Pâques, Herbe de bœuf, Pain de coucou, Trefle aigre, Oseille à trois feuilles.*

<sup>6</sup> Several other species of *Oxalis* are also used; at the Cape, *O. compressa* and *caprina*; in the Antilles, *O. Plumieri*; in Chili, *O. tuberosa*, etc.

<sup>7</sup> L. *Spec.* 622.—JACQ. *Oxal. Mon.* n. 21, t. 78, fig. 4.—RUMPH. *Herb. Amboin.* v. t. 104, fig. 2.—RHEEDE. *Hort. Matabar.* 9, t. 19.—*Biophytum sensitivum* DC. *Prodr.* i. 690.

In Abyssinia, *Tschokko* or *Mitchamitcho* is considered a tolerably good tenifuge, whence its name *O. anthelmintica*.<sup>1</sup> The *Carambolas*<sup>2</sup> have generally the same properties as the *O. acetosella* (Fr. Surelle), to which they are nearly allied in organisation, but their fleshy fruits rich in acid juice are especially useful. They are used to remove spots of ink and mildew from linen, and to clean metals. They are eaten raw or preserved with sugar or with vinegar; as condiments, they enter into the preparation of dishes called *achars*, are prescribed as refreshing drinks in fevers, and as antiscorbutics. These last properties are found in the *Nasturtiums*, principally in *Tropæolum majus*<sup>3</sup> (fig. 31-37), *minus*,<sup>4</sup> *pentaphyllum*,<sup>5</sup> (fig. 38, 39), etc., the sharp taste and chemical composition rendering these plants antiscorbutic like the Crucifers,<sup>6</sup> whence the name of Indian and Mexican cress (Fr. *Cresson d'Inde, de Mexique*), etc., given to these plants. With us the flowers of *Nasturtiums* are eaten as salad, and the buds and green fruit pickled with vinegar.<sup>7</sup> The *Flærkeas* have the same properties and savour, but in a less degree. It is nearly the same with the *Balsams*. Their organs, fleshy and rich in water, contain traces of acrid bitter qualities. *Impatiens Noli-tangere*<sup>8</sup> (fig. 49) was formerly much valued as diuretic and antihemorrhoidal. It was topically used for pains in the joints, and was said to cure diabetes, but is not much thought of at present. Several *Balsams* are tinctorial plants.<sup>9</sup> In Japan, one of them *I. cornuta*,<sup>10</sup> is said to make the hair grow. The best

<sup>1</sup> A. RICH. *Fl. Abyss. Tent.* i. 124.—ROSENTH. *op. cit.* 897.

<sup>2</sup> Namely *Averrhoa Carambola* et *Bilimbi* (see p. 26, notes 6, 7).

<sup>3</sup> L. *Spec.* 490.—CURT. in *Bot. Mag.* t. 23.—TURP. in *Dict. Sc. Nat. Atl.* t. 133.—DC. *Prodr.* i. 683, n. 2.—GUIB. *op. cit.* iii. 571.—REV. in *Bot. Méd.* du xix. Siècle, i. 257.—*Cardaminidum ampliori folio et majori flore* T. *Inst.* 430.—*Viola indica scandens Nasturtii sapore* Hort. Lugd.-Bat. ex T. (Blood flower, great Indian Cress, American Cress).

<sup>4</sup> L. *Spec.* 490.—SCHUHR. *Handb.* t. 105.—CURT. in *Bot. Mag.* t. 98.—*Cardaminidum minus et vulgare* T. *loc. cit.* (*Petit Cresson d'Inde*).

<sup>5</sup> LAMÉ. *Dict.* i. 605; *Ill.* t. 277.—DC. *Prodr.* n. 11.—*Chymocarpus pentaphyllus*, DC. in *Trans. Linn. Soc.* xvii. 13, 145.—A. S. H. *Pl. us. Bras.* t. 41.—? *Magallana porrifolia* CAV. *Icon.* iv. 51, t. 374.—DC. *Prodr.* i. 684.

<sup>6</sup> They produce also a sulphurate essential oil Vol. V.

(CLOEZ) whose properties are the same; the presence of a free phosphoric acid has been maintained (BRACONNOT). To this is attributed the emission of light from the flowers during warm nights, noticed by the daughter of LINNÆUS.

<sup>7</sup> The juice of these plants stains yellow. The tubercles or subterranean stems are edible like those of *Oca*.

<sup>8</sup> L. *Spec.* 1328.—SCHUHR. *Handb.* t. 270.—GREN. et GODR. *Fl. de Fr.* i. 325.—GUIB. *op. cit.* iii. 571.—ROSENTH. *op. cit.* 897 (*Herbe de Sainte-Catherine*).

<sup>9</sup> Especially *I. fulva* NUTT. et *tinctoria* A. RICH. *Fl. Abyss. Tent.* i. 120 (*Ensessella, Gaurelile* of Abyss.). The Tartars are said to colour their eyes and nails with the juice of several *Balsams* and with alum.

<sup>10</sup> L. *Spec.* 1328.—*Balsamina cornuta* DC. *Prodr.* i. 686, n. 3.—BURM. *Zeyl.* 41, t. 16, fig. 1.—LOUR. *Fl. Cochinch.* ed. ulyssip. (1790), 626.

known is the beautiful ornamental plant, a native of India, of which we possess so many rich varieties, *I. Balsamina*<sup>1</sup> (fig. 40-48). The family under consideration is one of those to which our cultivation owes most of its ornamental species. It is sufficient to name the beautiful *Geraniums* and *Erodiums* of our gardens; the numerous species of *Pelargonium* in our green-houses and windows; the magnificent *Monsonias*, the culture of which has become rare; the *Nasturtiums* almost all climbing, generally sown as annuals; the species of *Ovalis*, with pretty yellow, white, pink, or red flowers, some two-coloured, and some *Flarkeas*, especially *F. (Limnanthes) Douglasii* (fig. 50-54) often planted in our gardens.

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<sup>1</sup> L. Spec. 1318.—BLACKW. Herb. t. 583.— 485.—DC. Prodr. i. 685. (*Herbe impatiente*, *Balsamina hortensis* DESP. in Dict. Sc. Nat. iii. *Jalousie, Merveille*.)

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## GENERA.

## I. BIEBERSTEINIEÆ.

1. **Bieberstein** STEPH.—Flowers regular hermaphrodite; receptacle convex. Sepals 5, imbricate, persistent and alternate to equal number of petals, imbricate or sometimes contorted. Stamens 10, hypogynous, 2-seriate; filaments towards the base 1-adelphous, afterwards free; anthers introrse, 2-rimose, versatile. Glands 5, alternipetalous, inserted outside below the stamens. Carpels 5, oppositipetalous; ovaries free, 1-locular; styles 5, inserted at the middle of the internal angle of ovary, afterwards cohering among themselves in a slender column, capitate stigmatiferous at apex; ovule in internal angle of each ovary 1, descendent, incompletely anatropous; micropyle extrorse superior. Ripe carpels 5, free, enclosed in calyx, afterwards separating from axis, dry rugose venose indurate crustaceous, indehiscent. Seed incurvate, albumen thin fleshy; embryo arched; radicle conical superior; cotyledons plane or corrugate rather thick.—Perennial herbs; stem sometimes very short, tuberosc below the ground; leaves alternate, like nearly the whole plant glandular-pilose or villose, pinnate dissected or compound, stipulate; flowers in axillary pedunculate racemes; pedicels 2-bracteolate. (*Greece, west. and central Asia.*) See p. 1.

## II. GERANIEÆ.

2. **Geranium** L.—Flowers regular hermaphrodite; receptacle convex. Sepals 5, imbricate. Petals same in number, alternate, imbricate or contorted. Glands 5, alternipetalous. Stamens 10, 2-seriate fertile hypogynous; filaments free or connate at base; anthers introrse; 2-rimose. Ovary free, 5-locular; apex rostrate and forming style, style branches 5, longitudinally stigmatiferous at apex; cells 5, oppositipetalous, 2-ovulate; ovules collateral or oftener more or less

superposed descending with extrorse superior micropyle, one sometimes more or less ascendent. Fruit capsular; cells 5, generally 1-spermous septifragally solute from columella of axis, descendent with style usually from base to apex elastically revolute. Seeds generally descendent; albumen scanty or 0; radicle of embryo (sometimes coloured) incumbent on induplicate-plicate or convolute cotyledons.—Herbs, sometimes suffrutescent or caespitose-subcaulis at base; branches articulate-nodose; leaves alternate or opposite, dentate or palmate or more rarely digitate lobed or dissected; petioles incrassate at base, 2-stipulate; flowers at summit of peduncle axillary or lateral, solitary or more usually in cymes (rarely multifloral), 1-lateral sometimes umbelliferous. (*All temperate and trop. mount. regions.*) See p. 3.

**3. *Erodium* L'HÉR.**—Flowers (of *Geranium*) regular or scarcely irregular; stamens 5 alternipetalous antheriferous; oppositipetalous sterile antherless, sometimes squamiform. Germen and fruit of *Geranium*; cauda of carpels inwardly usually barbate or villous.—Herbs or undershrubs; leaves inflorescence and other characters of *Geranium*. (*North tem. regions of old world, South Africa, Australia.*) See p. 6.

**4. *Monsonia* L.**—Flowers nearly of *Geranium*; petals entire (*Holopetalum*) or dentate (*Odontopetalum*.) Stamens 15, 5 alternipetalous larger, and 10 oppositipetalous in pairs, in 5 series, the alternipetalous more or less high connate, 5-adelphous and at base generally 1-adelphous. Other characters of *Geranium*.—Herbs or undershrubs, stems sometimes fleshy or succulent; petioles spinosecent (*Sarcocaulon*); leaves alternate or opposite, crenate or dentate (*Holopetalum*), sometimes lobate or multifid (*Odontopetalum*) stipules 2, lateral; inflorescence of *Geranium*. (*South, north-eastern Africa, trop. west. Asia.*) See p. 6.

**5. *Pelargonium* L'HÉR.**—Flowers irregular; sepals 5, imbricate; the posterior adnate to pedicel in form of a spur. Petals 5, imbricate; 3 anterior in bud different from posterior, more interior, sometimes very small or all aborting; anterior lateral interior, regular. Stamens 10; filaments eglandular, connate at base, 5 of them alternipetalous generally antheriferous, more rarely the anterior 1, 2 antherless; oppo-



sitipetalous 5, either sterile antherless, or oftener the 2 posterior fertile. Gynæceum fruit and seed of *Geranium* (or *Erodium*).—Herbs undershrubs or shrubs, glabrous or pubescent, often viscous, fragrant, aromatic, sometimes fleshy and succulent; leaves opposite or alternate, entire, dentate, lobate or variously dissected; stipules lateral; flowers cymose at summit of peduncle; cymes sometimes umbelliform, oftener 1-parous, more rarely few or 1-flowered. (*North, east and south Africa, Australia, and New Zealand.*) See p. 7.

### III. NEURADEÆ.

6. **Neurada** L.—Flowers regular; receptacle concave cupular, sepals 5, and petals same in number, small, imbricate inserted at margin of receptacle. Stamens 10, 2-seriate perigynously inserted with perianth in the throat of receptacle; filaments free, very short, dilated at base; anthers introrse, 2-rimose. Carpels usually 10 (or 5–9) affixed to interior of receptacle; germens sessile or foveolate inserted, subhorizontally patent; styles erect at base widely subulate, afterwards cohering among themselves, capitellate stigmatiferous at apex; ovule in germens solitary descendent (subhorizontal as to flower); micropyle extrorse superior. Fruit carpels 10 or fewer dry, becoming hians above, 1-spermous, inserted in cavity of persistent accrescent dry receptacle, depressed conical and much echinate, induviate, surmounted by spinescent styles. Seed curved; embryo exalbuminous; cotyledons linear-oblong rather flat auriculate at base; radicle short decurved, near axis of receptacle, plantule germinating within induviate fruit.—Annual lanate ramified herbs, branches becoming ligneous, decumbent; leaves alternate lobate petiolate; stipules (?) lateral minute 1, 2; flowers axillary, solitary, pedunculate, surrounded at base with epicalyx of 5 bracts alternating with calyx. (*North Africa, south-western Asia.*) See p. 9.

7. **Grielum** L.—Flowers (nearly of *Neurada*) ecalyculate. Petals 5 (of *Geranium* or *Monsonia*), large, contorted. Stamens 10, perigynous. Carpels 5–10 and fruit of *Neurada*.—Humble annual caescent diffuse ramified herbs; branches decumbent; leaves alternate petiolate, pinnate, lobate, or decompose; lobes linear; stipules small or 0; flowers axillary, solitary long pedunculate. Other characters of *Neurada*. (*South Africa.*) See p. 10.

## IV. BALBISIEÆ.

8. **Balbisia** CAV.—Flowers regular hermaphrodite; receptacle convex. Sepals 5, imbricate, persistent. Petals same in number, alternate, contorted. Glands 0. Stamens 10, hypogynous, 2-seriate free; anthers at margin or subextrorsely rimose. Germen superior; cells 5, alternipetalous; styles divided later into five lobes, lingulate, stigmatiferous inwardly and at margin; ovules inserted at internal angle of cells  $\infty$ , anatropous. Capsule septicidal and at apex loculicidal; valves 5, persistent at middle of septa and below axis; seeds  $\infty$ , angular; albumen thin fleshy; embryo folded; radicle incumbent or enclosed between corrugate cotyledons.—Undershrubs more or less canescent; leaves alternate and opposite exstipulate, generally 3-partite; flowers terminal solitary pedunculate; bracts  $\infty$ , linear inserted forming epicalyx below calyx. (*Peru and Chili sublimit.*) See p. 11.

9. **Wendtia** MEYEN.—Flowers (nearly of *Balbisia*) 10-androus; germen 3-locular (or more rarely 4-locular); style branches same in number, lingulate. Ovules in cells 2, collaterally descendent; micropyle extrorsely superior. Capsules loculicidal 3-valved at apex.—Small ramified shrubs; leaves opposite small 3-5-lobed or dissected; flowers terminal pedunculate solitary or scantily cymose; bracts linear forming epicalyx inserted below calyx. (*South Peru, Chili.*) See p. 12.

10. **Rhynchotheca** R. et PAV.—Flowers (nearly of *Wendtia*) apetalous; germen cells 5, oppositisepalous; style shortly 5-lobed; lobes stigmatiferous, thickly lingulate; ovules in cells 2, descendent; micropyle extrorse superior. Fruit capsular; lobes from columella septifragally solute, not revolute. Seeds in cells usually solitary, scantily albuminous; embryo of flat cotyledon straight.—Much ramified small shrubs sometimes spinescent; leaves opposite small, entire or 5-lobed; flowers terminal pedicellate subumbellate, ecalyculate. (*South America Andes.*) See p. 13.

11. **Viviania** CAV.—Flowers (nearly of *Wendtia* or *Balbisia*) 4, 5-merous; sepals free or connate at base, valvate. Petals contorted. Glands 4, 5, alternipetalous, entire or 2-fid. Stamens 8-10, 2-seriate, all fertile. Germen 2, 3-locular; ovules in cells 2,

descendent or oblique (sometimes ascendent); micropyle usually extrorse superior. Capsule 2-3-merous, loculicidal; valves persistent by middle of septa in columella. Seeds in each 1, 2, descendent or more rarely ascendent; albumen fleshy; embryo linear curved or circinate.—Small shrubs or herbs diffuse or much ramified; leaves opposite entire or crenate or dentate exstipulate; flowers in uppermost axils at or apex of branches compound cymose; inflorescence sometimes umbelliform or corymbiform. (*South sub trop. or extratrop. America*) See p. 13.

## V. TROPÆOLEÆ.

12. **Tropæolum** L.—Flowers hermaphrodite irregular; receptacle cupular, more or less long produced at back in a free spur of varied form, nectariferous within. Sepals 5, inserted at margin (often coloured), imbricate or subvalvate. Petals 5, or fewer by abortion (the anterior wanting or small), unequal (of varied form and colour), imbricate. Stamens 8, 2-seriate; 4 alternipetalous (posterior deficient) and 4 oppositipetalous (anterior deficient); filaments free; anthers 2-locular, laterally or introrsely rimose. Germen free; cells 3 (2, anterior alternipetalous; style apiculate or inserted at summit of depressed germen divided at apex into 3 branches equal or unequal, stigmatiferous within. Ovules in cells solitary descending, micropyle extrorse superior. Fruit carpels 3, becoming dry or more or less indurate-fleshy or subdrupaceous, separating from short columella, rugose, indehiscent. Embryo of descendent seed exalbuminous; cotyledons thick plano-convex; radicle short superior.—Voluble or sometimes diffuse herbs; leaves alternate, peltate or angular palmate, lobed or dissected; stipules 0 or more rarely minute, setiform or dissected; flowers axillary solitary pedunculate. (*South America*.) See p. 14.

## VI. BALSAMINEÆ.

13. **Impatiens** L.—Flowers irregular hermaphrodite; receptacle small convex. Sepals 5 (anterior 2 small, usually all wanting in adult flower); posterior large, produced at base into a hollow spur, præfloration imbricate. Petals 5 imbricate; 4 posterior more or

less high laterally connate in pairs; the anterior concave in præfloration most external. Stamens 5, alternipetalous; filaments short complanate, subfree or more or less high connate; anthers 2-locular, connivent or coherent introrsely dehiscent. Germen free, 5-locular, produced at apex in a style very short or subnil, 5-dentate or 5-fid-stigmatiferous; ovules in oppositipetalous cells  $\infty$ , anatropous, usually descendent; micropyle superior at summit of incrassate funicle more or less obturated. Capsule varied in form, loculicidal; valves 5 (or fewer by abortion), opening elastically; columella persistent or with deciduous or evanescent valves; pericarp sometimes (*Hydrocera*) more or less fleshy, indehiscent. Seeds  $\infty$ ; cotyledons of exalbuminous embryo thick plano-convex; radicle short superior.—Herbs, sometimes suffrutescent at base; leaves alternate or opposite, simple; petiole often glanduliferous at base; flowers axillary, solitary or cymose, sometimes in terminal cymiferous racemes; pedicels often nutant and flowers reversed about the time of anthesis. (*North and tem. Europe, trop. and tem. Asia, North America, cont. and ins. Africa.*) See p. 17.

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## VII. FLÆRKEÆ.

14. **Flærkea** W.—Flowers regular; receptacle subplane at apex. Sepals 3 (*Eufærkea*), or 5 (*Linnanthus*), valvate. Petals same in number, alternate contorted. Stamens double in number to petals 2-seriate, subperigynous; filaments free; the alternipetalous longer, base outwardly developed in short gland. Anthers 2-locular introrsely rimose, finally versatile. Germens opposite sepals and equal in number, free, 1-locular; styles same in number gynobasic, afterwards connate in column, divided at apex into short stigmatiferous branches; ovules in each germen 1, anatropous, ascendent, subbasilar; micropyle extrorse inferior. Fruit carpels 3–5, subdrupaceous, finally dry indurate indehiscent rugose, separating from short columella, 1-spermous; seeds exalbuminous; embryo thick fleshy; cotyledons plano-convex; radicle short inferior enclosed at base in cordate cotyledon.—Glabrous diffuse annual herbs; leaves alternate dissected exstipulate; flowers axillary solitary pedunculate. (*North-west America.*) See p. 20.

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## VIII. OXALIDEÆ.

15. **Oxalis** L.—Flowers regular (sometimes 2-morphous); receptacle convex. Sepals 5, imbricate; the exterior usually marked with 2- $\infty$  glandular spots. Petals same in number (sometimes small or 0) alternate contorted deciduous, often cohering at margin and slightly insymmetrical. Stamens 10, 2-seriate; filaments free or coalescing at base; the alternipetalous longer and accompanied outside the base by a small scale of various form; anthers introrse, 2-locular, often versatile, 2-rimose. Germen superior; cells 5, oppositipetalous; styles same in number; apex stigmatiferous variously incrassate, capitate, 2-fid or lacinate recurved. Ovules in cells 2- $\infty$ , 2-seriate, descendent; micropyle extrorse superior, sometimes obturated by a small processus of the placenta. Fruit capsular loculicidal; valves persisting to columella by middle of septa or rarely solute and patent (*Biophytum*). Exterior seed coat fleshy, falling elastically and solute from crustaceous testa; albumen fleshy; inferior cotyledons of straight embryo foliaceous. Small shrubs to mostly herbs; stem often subterraneous, sometimes bulbous or tuberculose fleshy, varied in form; leaves radical or cauline alternate exstipulate; petiole sometimes phyllodinous; limb pinnate or oftener digitate 3- $\infty$ -foliate, sometimes 0; flowers solitary or in cymes at summit of peduncle, often 1-parous, umbelliform. (*All temp. regions and some tropical*). See p. 22.

16. **Hypseocharis** REMY<sup>1</sup>.—Flowers (nearly of *Oxalis*) 5-merous; stamens 15, finally more or less in 3-series. Glands  $\infty$ , unequal minute outside the androecium. Other characters of *Oxalis*.—Perennial herbs; stems short sometimes subterraneous; leaves alternate pinnate  $\infty$ -foliolate or deeply cut; folioles entire or 3-lobed; inflorescence of *Oxalis* cymose few flowered umbelliform, pedunculate. (*Bolivian Andes*.) See p. 26.

17. **Averrhoa** L.—Flowers of *Oxalis*, 5-merous eglandular; stamens 10, all fertile, or the oppositipetalous antherless. Ovules  $\infty$ . Fruit baccate oblong, 5-agonal, indehiscent. Other characters of *Oxalis*.—Trees or shrubs; leaves alternate exstipulate imparipinnate or 1-3-foliolate (*Connaropsis*); flowers in compound cymes, short axillary terminal or springing from wood of branches. (*Trop. Asia*.) See p. 26.

## XXXVII. LINACEÆ.

## 1. FLAX SERIES.

The Flaxes <sup>1</sup> (fig. 69-76) have regular hermaphrodite flowers, with

*Linum usitatissimum.*



Fig. 69. Habit ( $\frac{3}{8}$ ).

<sup>1</sup> *Linum* DILLÉN. ex L. *Gen.* v. 389.—ADANS. *Fruct.* ii. 146, t. 112.—LAMK. *Dict.* iii. 518  
*Fam. des. Pl.* ii. 269.—J. *Gen.* 303.—GÆRTN. *Suppl.* iii. 441; *Ill.* t. 219.—DC. *Prodr.* i. 423.

convex receptacle. The calyx is formed of five free sepals disposed in the bud in quincuncial præfloration, and the corolla consists of five alternate petals, like the sepals also contorted in the bud and falling early. The stamens are ten in number, all united among

*Linum usitatissimum.*



Fig. 70. Long. sect. of flower (?).



Fig. 71. Diagram.



Fig. 72. Flower, without perianth (?).



Fig. 73. Calyx, and gynoecium (?).

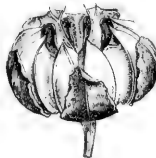


Fig. 74. Dehiscent fruit (?).



Fig. 75. Long. sect. of seed (?).

themselves at the base; but only five of them, those superposed to the sepals, are fertile, being formed of a filament dilated below and of an introrse bilocular anther dehiscing by two longitudinal clefts<sup>1</sup>. The five other stamens are destitute of anthers and reduced to short filaments superposed to the petals. Outside the androecium are seen

—TURP. in *Dict. Sc. Nat. Atl.* t. 135.—SPACH, *Suit. à Buffon*, iii. 272.—ENDL. *Gen.* n. 6056.—PAYER, *Organog.* 65, t. 13.—B. H. *Gen.* 242, n. 2.—H. B. in *Payer Fam. Nat.* 395.—SCHNIZL. *Iconogr.* t. 255.—LEM. et DCNE. *Tr. Gén.* 356 (incl.: *Adenolinum* REICHB., *Cuthartolinum* REICHB., *Cliococca* BAB. *Linopsis* REICHB., *Radiola*

GMEL. *Reinwardtia* DUMORT. *Xantholinum* REICHB.).

<sup>1</sup> The pollen is according to H. MOHL (in *Ann. Sc. Nat.* sér. 2, iii. 335), "ovoid; three folds; in water, ellipsoidal-flattened with three bands. *L. Austriacum*, *L. Flavum*."

five alternipetalous glands<sup>1</sup>. The gynæceum is composed of a free superior ovary, surmounted by a style soon divided into five branches superposed to the petals, with linear apex, elongated or capitate, bearing stigmatic papillæ. The ovary contains an equal number of oppo-

*Linum perenne.*



Fig. 76. Inflorescence.

sitipetalous cells, in the internal angle of which a placenta is seen supporting two collateral, descending, anatropous ovules, with exterior and superior micropyle,<sup>2</sup> capped by an obturator springing from the placenta above each ovule. From the outer wall of each cell or the midrib a false partition is produced which advances more or less between the two collateral ovules and may even reach the placenta, and so isolate each ovule in a compartment representing a half cell. The fruit, generally accompanied by the persistent calyx, is a septicidal capsule which divides into five dispermous pieces or into ten monospermous ones, when the false partition divides at maturity. The seeds contain, under their triple coat,<sup>3</sup> a fleshy albumen, often inconsiderable, surrounding a fleshy straight embryo, with superior radicle. The Flaxes are annual or perennial herbs, or suffrutescent plants, with simple entire leaves alternate or rarely opposite, sometimes accompanied by two small glanduliform stipules. The flowers<sup>4</sup> are united in terminal or axillary cymes, sometimes biparous and more or less regular in their lower parts, sometimes uniparous and resembling more or less contracted or elongated racemes. Some twenty-four species have been described,<sup>5</sup> natives

<sup>1</sup> Often but very little noticeable.

<sup>2</sup> With double coat.

<sup>3</sup> Three principal layers are distinguished; one an interior membrane, thin brownish rather tough surrounding the albumen; more outwardly a tissue also brown, paler, and stronger than the first from which it easily separates; and outside a white layer remarkable for the way in which it acts when brought into contact with water to form mucilage. As soon as it is touched by the liquid it thickens rapidly, all the cells without separating rise parallel to each other, the common partitions rise without separating in an instant. Later the action of

the liquid brings about a thickening, softening, and even an unequal breaking of the walls, etc.

<sup>4</sup> White, yellow, pink, red, or blue. They are often dimorphous, with two forms, one with long the other with short style, being much more fruitful it is said, when fertilized mutually than when alone, attention having first been drawn to this fact by DARWIN in his work: "On the existence of two forms and on their reciprocal sexual relation in several species of the genus *Linum*" (in *Journ. Linn. Soc.* vii. 69).

<sup>5</sup> *Sm. Brit. Fl.* i. 342; *Exot.* 17.—*JACQ. Fl. Austr.* t. 31, 215, 321, 418.—*REICHB. Ic. Fl. Germ.* vi. t. 325-341.—*WALDST. et. KIT. Pl.*



of most temperate or warm regions but extratropical, some belong to intratropical South America.<sup>1</sup>

*L. trigynum*,<sup>2</sup> a plant of Eastern India, and two neighbouring species have served to form the small genus *Reinwardtia*,<sup>3</sup> which arrangement, however, is questionable, as they are only distinguished by their hypogynous often unequal glands and their carpels three or four in number, instead of five as in the Flaxes.—They are shrubs or undershrubs, with alternate leaves and axillary flowers, solitary or in cymes, more rarely in terminal corymbiform cymes; we shall only make them a section of the genus *Linum*.

In *Linum catharticum*,<sup>4</sup> the leaves are opposite and the cymes more regular than in most of the other species; the genus *Cathartolinum*,<sup>5</sup> was made of them, but it has not been kept distinct.

In *L. Radiola*,<sup>6</sup> a very small French annual species, also distinguished as a genus under the name *Radiola*,<sup>7</sup> the organs of vegetation are disposed in the same way, but the flowers are tetramerous, and the sepals are generally tridentate: characters to which we no longer give generic value.

*Anisadenia*,<sup>8</sup> consisting of perennial herbs from the Himalayas, have nearly the flowers,<sup>9</sup> with trimerous gynæceum and unequal glands of *Reinwardtia*. One of the glands is often much more developed than the others. The fruit is said to be membranous; the sepals are dissimilar, the two interior remaining glabrous while the

*Rar. Hung.* t. 105, 177.—SIBTH. *Fl. Græc.* t. 307.—A. S. H. *Fl. Bras. Mer.* i. 129, t. 26.—C. GAY, *Fl. Chil.* i. 461.—A. GRAY, *Man.* ed. 5, 104.—CHAPM. *Fl. S. Unit. St.* 62.—HOOK. *F. Man. N.-Zeal.* *Fl.* 34.—BENTH. *Fl. Austral.* i. 282.—HARV. et. SOND. *Fl. Cap.* i. 309.—OLIV. *Fl. Trop. Afr.* i. 269.—WIGHT, *Ill.* t. 60.—BOISS. *Fl. Or.* i. 848.—GREN. et GODR. *Fl. de Fr.* i. 279–285.—LINDE. in *Bot. Reg.* t. 1326.—*Bot. Mag.* t. 234, 312, 403, 431, 1048, 1086, 1100, 1163, 4956, 5112, 5474, etc.—WALP. *Ann.* ii. 113; iv. 295; vii. 459.

<sup>1</sup> PLANCHON, who made a complete revision of this genus in 1847–48 (in *Hook. Lond. Journ.* vi. 588; vii. 165), divided the Flaxes into four sub-genera, i.e.: 1. *Eulinum*, 2. *Chiococca*, 3. *Linastrium*, 4. *Syllinum*. Then he admits sections in the sub-genera, except in the second which remains undivided, i.e. for the first, *Protolinum* and *Adenolinum*; for the third, *Dichrolinum*, *Cathartolinum*, *Linopsis* and *Halolinum*; for the fourth, *Limoniopsis* and *Dasylinum*. In taking

the sub-genera as sections we add two others: *Radiola* and *Reinwardtia*.

<sup>2</sup> ROXB. *Fl. Ind.* ii. 110.—SIMS in *Bot. Mag.* t. 1100.—SM. *Exot.* t. 17.

<sup>3</sup> DUMORT. *Comm. Bot.* 19.—PL. in *Hook. Lond. Journ.* vii. 522.—B. H. *Gen.* 243, n. 3.—H. BN. in *Adansonia*, x, 361.—WALP. *Ann.* ii. 135.—*Macrolinum* REICHR.  *Ic. Fl. Germ.* vi. 68.—*Kittelocharis* ALEF. in *Bot. Zeit.* (1863), 282.

<sup>4</sup> L. *Spec.* 401.—SCHKUHR. *Handb.* i. t. 87.—DC. *Prodr.* i. 428, n. 46.

<sup>5</sup> REICHR.  *Ic. Fl. Germ.* vi. 67.—GRIESE. *Spicil. Fl. Rum.* 115.

<sup>6</sup> L. *Spec.* 402.

<sup>7</sup> DILL. *Giess.* 161; *Gen. App.* 127, t. 7.—GMEL. *Syst.* i. 289.—DC. *Prodr.* i. 428.—ENDL. *Gen.* n. 6057.—B. H. *Gen.* 242, n. 1.

<sup>8</sup> WALL. *Cat.* n. 1510.—ENDL. *Gen.* n. 5053.—B. H. *Gen.* 243, n. 4.—H. BN. in *Adansonia*, x. 361.

<sup>9</sup> White or pink.

exterior bear outwardly one or two series of stipitate glands,<sup>1</sup> and the flowers are united in terminal spikes or racemes, elongate, simple or formed of few-flowered cymes. Two species of them are distinguished,<sup>2</sup> whose membranous leaves are alternate, pinninerved, dentate like a saw and accompanied by intrapetiolar stipules.

## II. HUGONIA SERIES.

The flowers of *Hugonia*,<sup>3</sup> (fig. 77-79) are very analogous to those of the *Flaxes* in their general organization. They have, upon a convex

*Hugonia serrata*.

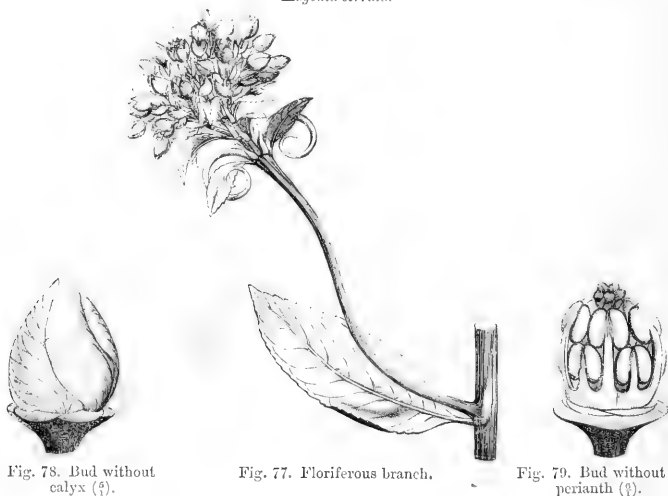


Fig. 78. Bud without calyx (♂).

Fig. 77. Floriferous branch.

Fig. 79. Bud without perianth (♀).

receptacle, five sepals often unequal, quincuncially imbricated, five petals contorted and caducous, and ten monadelphous stamens of

<sup>1</sup> This together with the form of the inflorescence makes these plants resemble *Plumbago*.

<sup>2</sup> GRIFF. *Notul.* iv. 534, t. 593.—FENZL. *Darst. Vier Pfl. Gatt.* 21, t. 3.

<sup>3</sup> L. *Gen.* n. 831.—ADANS. *Fam. des Pl.* ii. 314.—J. *Gen.* 275.—LAMK. *Dict.* iii. 148; *Ill.* t. 572.—GERTN. *Fruct.* i. 281, t. 58.—DC. *Prodr.* i. 522.—ENDL. *Gen.* n. 5404.—PL. in *Hook.*

which five shorter are superposed to the petals. Their filaments are united below into a short tube, with five alternipetalous angles sometimes thickened, as in the Flaxes, into elongate glands; afterwards they separate, and each bears above, a bilocular, introrse anther, dehiscing by two longitudinal clefts. The ovary is formed of five alternipetalous cells, more rarely of four or three, surmounted by a like number of style branches, capitate stigmatiferous at the apex. In the internal angle of each cell are seen two descendent ovules, generally collateral with exterior micropyle surmounted usually by a thick obturator. The fruit is a drupe enclosing from three to five mono- or dispermous stones. The seeds are generally compressed, and contain under their coats a fleshy albumen, surrounding a straight or arched embryo, with short superior radicle. *Hugonia* consists of shrubs, often climbing, from all tropical regions, with alternate simple penninerved leaves accompanied by entire or slashed stipules. The flowers are generally in terminal ramified racemes composed of ebracteate cymes. As a rule also the lower divisions of the inflorescence, one or two in number, are transformed into a thick hook recurved below and rolled spirally. In certain species of *Hugonia*, principally natives of tropical Africa, the flowers are united in the axils of the leaves into very short racemes or spikes, simple or ramified. It is so in *Roucheria*,<sup>1</sup> recently ascribed<sup>2</sup> to the genus *Hugonia*, and of which three species are known, two from tropical America, the other from tropical Asia. The flowers are accompanied by unequal bracts of variable number, analogous to the sepals but smaller.

In some *Hugonias* from New Caledonia, recently described under the name of *Penicillanthemum*,<sup>3</sup> the stems are generally not climbing as in *Roucheria*, the sepals are obtuse and the inflorescence destitute of hooks at the base. The same characters are found in *Sarcotheca macrophylla*,<sup>4</sup> a shrub from the Indian Archipelago which ought, it

*Lond. Journ.* vii. 524.—B. H. *Gen.* 243, 987, n. 5.—H. Bx. in *Payer Fam. Nat.* 396; in *Adansonia*, x. 364.—*Egotoceras* RAY (ex ADANS.).

<sup>1</sup> Pl. in Hook. *Lond. Journ.* vi. 141, t. 2.—B. H. *Gen.* 243, 987, n. 6.

<sup>2</sup> F. MUELL. *Fragm.* v. 7.

<sup>3</sup> VIELL. in *Bull. Soc. Linn. Normand.* x. 94.—B. H. *Gen.* 987.—H. Bx. in *Adansonia*, x. 364. We believe that one of these *Penicillanthemum* is *Durandea* (Pl. *loc. cit.* vii. 527;—B. H. *Gen.*

245, n. 10;—WALP. *Ann.* ii. 137), to which uniovulate cells may erroneously have been attributed, the two collateral ovules being very near each other and united above by a common obturator.

<sup>4</sup> Bu. *Mus. Ludg.-Bat.* i. 241.—B. H. *Gen.* 245, n. 11.—H. Bx. in *Adansonia*, x. 364.—WALP. *Ann.* ii. 137.—*Roucheria macrophylla* Miqu. *Fl. Ind.-Bat.* i. p. ii. 136.—WALP. *Ann.* vii. 462.

would seem, to be ascribed to *Hugonia*, but in which the young seeds are nearly superposed, instead of being collateral, and capped by a common obturator. Finally in the two American species of *Hugonia* destitute of hooks, like most of these from New Caledonia, the hairs on the internal face of the petals, but little developed in the latter, are here much longer and more numerous, whence the origin of the name *Hebepetalum*,<sup>1</sup> considered as forming a special genus. The bases of the petals, already thick and fleshy in the New Caledonian species, become here more prominent within, and may even represent a kind of middle crest or basilar scale. The presence of this thickening does not, however, suffice to characterise a genus, any more than does the prominent alternipetalous glands of the androecium tube, which characters are found in some Asiatic species of *Hugonia*. This, with its three sections,<sup>2</sup> comprises about twenty species.<sup>3</sup>

*Ochthocosus*,<sup>4</sup> allied to *Hugonia*, is distinguished from it by its perianth persisting round the fruit, its single style, and its dry septi-cidal pericarp. Three species are known: one American,<sup>5</sup> whose dry petals are not very thick, and whose ripe carpels are, like those of the *Flaxes*, divided by a false partition; the second,<sup>6</sup> a native of tropical western Africa, whose ovary cells present a centripetal rudiment of a false partition, and whose petals thicken and harden round the capsule. In the third,<sup>7</sup> the type of a genus *Phyllocosmus*,<sup>8</sup> the petals become hard, but the false partition is said to disappear. All these plants are frutescent, glabrous, with alternate leaves, the stipules and flowers grouped in cymes on small axillary branches.

In another secondary group,<sup>9</sup> formed by *Ixonanthes*,<sup>10</sup> the ovary

<sup>1</sup> BENTH. *Gen.* 244, n. 9.

<sup>2</sup> HUGONIA: {  
sect. 5. {  
1. *Mystax* (RAY).  
2. *Rouchevia* (PL.).  
3. *Durandea* (PL.).  
4. *Sarcotheca* (BL.).  
5. *Hebepetalum* (BENTH.).

<sup>3</sup> CAV. *Diss.* iii. 177, t. 73.—BUCH. *Dec.* i. t. 8. 9.—WIGHT et ARN. *Prodr.* i. 72.—WIGHT, *Ill.* t. 32.—OLIV. *Fl. Trop. Afr.* i. 270.—WALP. *Ann.* i. 96; ii. 136, 137.

<sup>4</sup> BENTH. in *Hook. Lond. Journ.* ii. 366.—B. H. *Gen.* 245, n. 12.—H. BN. in *Adansonia*, x. 336.

<sup>5</sup> *O. Roraimæ* BENTH. *loc. cit.*—WALP. *Rep.* v. 135.

<sup>6</sup> *O. Sessiliflorus* H. BN. *loc. cit.*—*Phyllocosmus sessiliflorus* OLIV. *Fl. Trop. Afr.* i. 273, n. 2.

<sup>7</sup> *O. africanus* HOOK. F. in *Hook. Icon.* t. 773; *Niger*, 240, t. 23.—WALP. *Ann.* i. 124.—*Pentacocca leonensis* TURCZ. in *Bull. Mosc.* xxvi (1863), 601.

<sup>8</sup> *P. africanus* KL. in *Abh. d. Berl. Acad.* (1856), 232.—OLIV. *loc. cit.* n. 1.—WALP. *Ann.* vii. 464.

<sup>9</sup> *Ixonanthes* (*Lineæ* trib. 4 B. H. *Gen.* 242, 245).

<sup>10</sup> JACK, *Mal. Misc. ex. Hook. Comp. to Bot. Mag.* i. 154.—B. H. *Gen.* 245, n. 14.—H. BN. in *Adansonia* x. 367.—*Ixonanthes* ENDL. *Gen.* n. 5557.—*Emmenanthes* HOOK. et ARN. in *Beech.*

with five alternipetalous cells is surmounted by a single style with discoidal or capitate stigmatiferous apex entire or but slightly lobed, and is inserted in a small receptacular cup bordered by an annular or cupuliform disk. The five imbricated sepals and the five contorted petals are slightly perigynous, as is the androceum, inserted outside the disk formed of from ten to fifteen or twenty stamens. In each of the ovary cells are found two collateral descendent incompletely anatropous ovules. The exostome, superior and exterior, is already elongated and tubular in the flower, and it becomes much more so in the seed which it surpasses several times in length, while upon each side of the hilum a descendent appendage is developed of variable length. The fruit, at the base of which persists the receptacle and perianth, is a septicial capsule of which each cell is more or less completely divided into two by a false centripetal partition. The two or three known species of *Ixonanthes*<sup>1</sup> are trees from tropical Asia, with alternate, simple leaves with or without stipules, and with small flowers disposed in axillary cymes, dichotomous and long pedunculate.

### III. ERYTHROXYLON SERIES.

The flowers of *Erythroxylon*<sup>2</sup> (fig. 80-87) are regular and hermaphrodite with convex receptacle, bearing five sepals,<sup>3</sup> free or slightly united at the base, quincuncially imbricated or almost valvate in the bud, and five alternate caducous petals. They are contorted or imbricated in præfloration, and their inner surface presents at the base an appendage of variable form generally divided into two symmetrical lobes.<sup>4</sup> The stamens are double in number to the petals, five

Voy. Bot. 217.—*Brevestera* R&M. Syn. i. 132, 141.—*Pierotia* BL. Mus. Lugd.-Bat. i. 179.

<sup>1</sup> GRIFF. Pl. Cantor. 11, t. 1.—CHAMP. in Trans. Linn. Soc. xxi. t. 13.—Miq. Fl. Ind.-Bat. i. p. ii. 494; Suppl. i. 484.—WALP. Rep. v. 376; Ann. iv. 351; vii. 464.

<sup>2</sup> L. Gen. n. 575 (*Erythroxylum*).—J. Gen. 253.—LAMK. Diet. ii. 392; Suppl. ii. 586; Ill. t. 383.—DC. Prodr. i. 573.—TURP. in Diet. Sc. Nat. Atl. t. 167.—MART. Mon. Erythrox. in Abh. Akad. Munch. iii. 279, t. 1-10 (1840).—SPACH, Suit. à Buffon, iii. 74.—ENDL. Gen. n. 5597.—B. H. Gen. 244, n. 7.—H. BN. in Payer Fam. Nat. 403.—BAKER, Fl. Maurit. 34.—*Venelia* COMMERS.

miss. (ex ENDL.).—*Roelana* COMMERS. miss. (ex ENDL.).—*Stuedelia* SPRENG. N. Entd. iii. 59; Syst. ii. 391.—*Sethia* H. B. K. Nov. Gen. et Spec. v. 175.

<sup>3</sup> Here and there are tetramerous or even hexamerous flowers.

<sup>4</sup> In *E. Coca*, for instance, this appendage has below the form of a kind of irregular porringer with the concavity turned inwards, with border glandular at the base. Above, it is surmounted by two upright prolongations situated one at the right the other at the left of the midrib, one symmetrical to the other and emarginate at the summit.

alternate and five superposed, all united among themselves below in a tube from which they separate,<sup>1</sup> each supporting a bilocular introrse versatile anther dehiscing by two longitudinal clefts.<sup>2</sup> The gynæceum is free, formed of an ovary generally three celled, the two posterior cells being surmounted by a style divided more or less high, but

*Erythroxylon Coca.*



Fig. 81. Bud ( $\frac{1}{2}$ ).



Fig. 80. Floriferous branch ( $\frac{1}{2}$ ).



Fig. 84. Superior  
(face of petal  $\frac{1}{4}$ ).



Fig. 82. Flowers ( $\frac{1}{2}$ ).

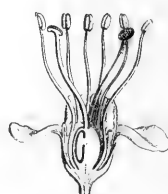


Fig. 83. Long. sect. of  
flower.

generally near the base,<sup>3</sup> into three branches whose stigmatiferous summit is swollen into a head or club. There is generally but one fertile cell, while the others are empty and often very little developed; the anterior one is fertile presenting in its internal angle one, or more rarely two descendent ovules, with micropyle looking outwards and upwards.<sup>4</sup> The fruit is a drupe accompanied at the base by the remains of the calyx and androceum, and with a stone, often thin, containing a seed whose coats cover an albumen<sup>5</sup> of variable thickness,

<sup>1</sup> The base of their free part is often encircled by an exterior ring or collarette, entire or crenate, formed by the superior edge of the tube.

<sup>2</sup> Consequently often extrorse in the expanded flower; the position which it occupies at first in certain living species such as *E. Coca*.

<sup>3</sup> It is in the Indian *Sethias*, (of which it is pro-

posed to make a completely distinct genus) and in some Brazilian species that the union of the styles extend highest.

<sup>4</sup> It has two coats.

<sup>5</sup> It is sometimes reduced to a membrane, oftener it is fleshy, thick round the radicle, and towards the back of the cotyledons.

and an axile embryo with plano-convex cotyledons and superior radicle. *Erythroxylon*, of which some fifty species<sup>1</sup> are known, consists of shrubs or bushes from all warm regions. The leaves are alternate, entire, penninerved,<sup>2</sup> petiolate, accompanied by intrapetiolar

*Erythroxylon Coca.*



Fig. 85. Androecium and gynaecium.



Fig. 87. Fruit.



Fig. 86. Gynaecium.

stipules. The flowers are solitary or united in small bunches of cymes in the axils of the leaves or the bracts which upon some branches take their place.

Beside *Erythroxylon* has been placed *Aneulophus Africana*,<sup>3</sup> which with nearly the same perianth has petals longer and more reflexed, traversed within upon the mid-line by a prominent rib, a monadelphous diplostemonous androecium, and an ovary with three or four biovulate cells surmounted by a like number of distinct styles. It is a glabrous shrub having opposite leaves with intrapetiolar connate stipules and flowers in axillary cymes.

## HOUMIRI SERIES.

*Houmiri*<sup>4</sup> (fig. 88-97) has regular hermaphrodite flowers organised nearly like those of *Ixonanthes*. The convex receptacle bears a

<sup>1</sup> CAV. *Diss.* viii. 399.—H. B. K. *Nov. Gen. et Spec.* v. 175, t. 453.—A. S. H. *Pl. Us. Brass.* t. 69; *Fl. Bras. Mer.* ii. t. 102, 103.—DELESS.  *Ic. Sel.* iii. t. 28.—WIGHT et ARN. *Prodr.* i. 106.—RONB. *Pl. Coromand.* t. 88.—WIGHT, *Ill.* t. 48; *Icon.* t. 97.—A. RICH. *Fl. Cub.* t. 27.—GRISEB. *Fl. Brit. W.-Ind.* 113.—HARV. et SOND. *Fl. Cap.* i. 233.—OLIV. *Fl. Trop. Afr.* i. 273.—BENTH. *Fl. Austral.* i. 283.—HOOK. in *Bot. Mag. Comp.* ii. t. 21.—WALP. *Rep.* i. 403; ii. 842; *Ann.* ii. 195; vii. 463.

<sup>2</sup> Often marked within by a surface of a par-

ticular colour limited by two curved lines, concave on the side of the midrib, and depending on the revivification of the limb as in certain species of *Ternstroemia*.

<sup>3</sup> BENTH. *Gen.* 244, 987, n. 8.—OLIV. *Fl. Trop. Afr.* i. 274.—? ? *Caucanthus* FORSK. *Fl. Æg.-Arab.* 91 (ex BENTH.).

<sup>4</sup> AUBL. *Guian.* i. 564, t. 225.—H. BN. in *Adansonia* x. 368.—*Humiria* J. *Gen.* 435.—DC. *Prodr.* i. 619.—*Humirium* MART. *Nov. Gen. et Spec.* ii. 142, t. 198, 199.—ENDL. *Gen.* n. 5486.—B. H. *Gen.* 247, n. 2.—H. BN. in *Adansonia*, i.

calyx with five deep divisions imbricated in the bud,<sup>1</sup> and five alternate petals whose præfloration is contorted or imbricated. The androecium is formed of ten stamens, superposed five to the divisions of the calyx and five shorter to the petals, in one species from

*Houtmirei arenarium.*



Fig. 88. Flower-bearing and fruit-bearing branch.

tropical Western Africa, *H. gabonensis*, of which we had at first made the type of a particular genus under the name of *Aubrya*.<sup>2</sup> The stamens are all fertile and free or united to a variable height by the base of the filaments, and they have a bilocular introrse anther, whose cells each dehiscing by a longitudinal cleft are applied below and within to a thick connective conical and flattened, whose summit much surpasses them in height.<sup>3</sup> In certain American species which have

209; in *Payer Fam. Nat.* 262.—*Myrodendron* SCHREB. *Gen.* 358 (incl. : *Aubrya* H. BN. *Helleria* NEES et MART. *Saccoglottis* MART. *Vantanea* AUBL. *Vantaneoides* Rich. *Werniseckia* SCOP.).

<sup>1</sup> So much smaller as they are more exterior in præfloration. In *Vantaneoides* of RICHARD (H. BN. in *Adansonia*, x. 369), the sepals are imbricated; but in the true *Vantanea*, as *V. guianensis*

AUBL. the teeth of the calyx do not even touch each other.

<sup>2</sup> H. BN. in *Adansonia*, ii. 262; x. 368.—B. H. *Gen.* 988, n. 2. a.—OLIV. *Fl. Trop. Afr.* i. 275.—WALP. *Ann.* vii. 464.

<sup>3</sup> H. MOHL (in *Ann. Sc. Nat. sér. 2*, iii. 335) describes the pollen as: "ovoid; three folds; in these are the papillæ; in water spherical, trian-



been placed in a genus *Saccoglottis*,<sup>1</sup> there are besides these ten fertile stamens, where the disproportion between the anther cells and the connective is most pronounced, ten interposed staminodes represented by as many subulate tongues united below to the fertile stamens. These staminodes become fertile in their turn in most of the American species, constituting in the genus a sec-

*Humiri arenarium.*

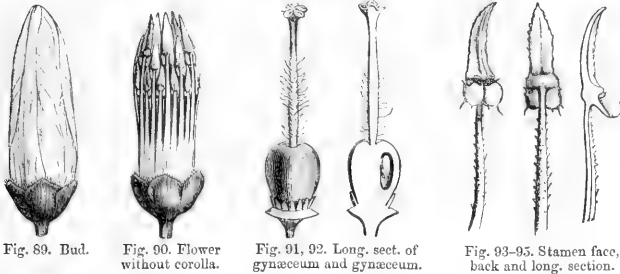


Fig. 89. Bud.

Fig. 90. Flower without corolla.

Fig. 91, 92. Long. sect. of gynoecium and gynæceum.

Fig. 93-95. Stamen face, back and long. section.

tion *Humirium* (fig. 90). In another section bearing the name *Vantanea*<sup>2</sup> (fig. 96, 97) the stamens are all fertile and still more numerous, for from twenty to thirty have been counted, and even as many as fifty or sixty. The gynæceum is free and superior, formed of an ovary with five alternipetalous cells,<sup>3</sup> surrounded at the base by a disk which is thick, circular, almost entire, or more or less thin, membranous, unequally cut upon the edges, or deeply divided into ten or fifteen pointed tongues. The style is simple, cylindrical, erect, swollen at apex into a small stigmatiferous head almost entire or slightly lobed. In the inner angle of each cell is seen a placenta supporting two descendent ovules, with micropyle directed outwards and upwards, and collateral, or nearly superposed by the elongation of the funicle of one of them: the other may abort more or less

gular upon the equator; the papillæ pretty large upon the bands of the angles.

<sup>1</sup> MART. *Nor. Gen. et Spec.* ii. 146.—ENDL. *Gen.* n. 5485.—H. BN. in *Adansonia*, i. 208; x. 368.—B. H. *Gen.* 247, n. 3.

<sup>2</sup> AUBL. *Guian.* 572, t. 229.—J. *Gen.* 434.—ENDL. *Gen.* n. 5383.—B. H. *Gen.* 246, n. 1.—H.

BN. in *Adansonia*, x. 368.—*Lemniscia* SCHREB. *Gen.* 358.—*Helleria* NEES et MART. in *Nov. Act. Nat. Cur.* xii. 38, t. 7.—ENDL. *Gen.* n. 5487.—H. BN. in *Adansonia*, i. 209.

<sup>3</sup> They are sometimes incomplete; sometimes they are more than five in number.

completely, or even disappear altogether.<sup>1</sup> The fruit is a drupe of which the mesocarp is frequently thin, and the stone hard and bony, with its walls often containing resiniferous hollows, and with one or more mono- or dispermous cells. The seeds contain under their thin coats a fleshy albumen, sometimes of granular appearance, surrounding an axile embryo with elliptical cotyledons and superior cylindrical radicle more or less long.

*Houmiri (Vantanea) guianensis.*



Fig. 96. Flower ( $\frac{2}{3}$ ).

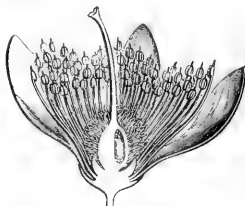


Fig. 97. Long. sect. of flower.

Thus comprised, the genus *Houmiri*, divided (principally according to the number of the stamens) into five sections,<sup>2</sup> which might possibly be considered as distinct genera, contains some twenty species<sup>3</sup> which except one belong to tropical America. All are woody and generally glabrous and balsamic. They have alternate simple leaves,<sup>4</sup> entire or crenulate, coriaceous, and exstipulate, flowers of whitish colour, disposed in the axils of the leaves at the summit of the branches in ramified or corymbiform cymes, sometimes uniparous towards the apex.

This small family, distinguished in 1819 by A. P. de Candolle,<sup>5</sup> according to him contained only *Linum* and *Radiola*, considered formerly by A. L. de Jussieu,<sup>6</sup> as “genera *Caryophylleis affinia*.” The *Hugonias*, ranged by the latter<sup>7</sup> among the *Malvaceæ*, and by most authors of this century after the *Chlcnaceæ*,<sup>8</sup> took finally a

<sup>1</sup> They have a double coat.

*Ann.* iv. 583, 585 (*Saccoglottis*).

<sup>4</sup> In veneration often involute.

<sup>2</sup> HOUMIRI: {  
sect. 5. {  
1. *Aubrya* (H. BN.).  
2. *Saccoglottis* (MART.).  
3. *Houmirium* H. BN. ncc *Altor.*.  
4. *Vantaneoides* (RICH.).  
5. *Vantanea* AUBL.).

<sup>5</sup> *Théor. Elém.* éd. 1. 217; *Prodr.* i. 423, Ord. 23.—*Linacæ* LINDL. *Introd.* ed 2, 89; *Veg. Kingd.* 485, Ord. 183.

<sup>6</sup> *Gen.* (1789), 303.

<sup>7</sup> *Op. Cit.* 275.

<sup>3</sup> MART. *Nov. Gen. et Spec.* ii. 142, t. 198; 146 (*Saccoglottis*), 147 (*Helleria*).—A. JUSS. in *A. S. II. Fl. Bras. Mer.* ii. 88, 90 (*Helleria*).—WALP.

<sup>8</sup> DC. *Prodr.* i. 522.—ENDL. *Gen.* 1016.—LINDL. *Veg. Kingd.* 489 (*Oxalid.*).

place as the type of a tribe in the family Linacæ, in the work of general revision published in 1847-48 by Planchon.<sup>1</sup> He there divided the Linacæ into three sections: *Eulineæ*, a large division comprising the three genera *Radiola*, *Linum*, and *Reinwardtia*, which he preserved distinct; *Hugoniæ*, a small group in which are united the three genera *Hugonia*, *Durandea*, and *Roucheria* (these two last then newly made); and *Anisadeniæ*, constituted by the simple genus *Anisadenia*, established in 1828 by Wallich and generally until then placed with the *Frankeniaceæ*.<sup>2</sup>

In 1862, BENTH. and HOOK.<sup>3</sup> left this family with nearly the same limits, only enlarging it by one new tribe to which the *Erythroxylons* give their name<sup>4</sup> and which contains with them the two new genera *Anculophus* and *Hebepetalum*. At the same time they separated the old group *Hugoniæ* into two tribes, only leaving in one<sup>5</sup> *Roucheria*<sup>6</sup> with *Hugonia*, and placing in the other with *Ixonanthes*,<sup>7</sup> from which it draws its name,<sup>8</sup> *Durandea*,<sup>9</sup> and three more genera then almost new and yet incompletely known, *Ochthocosmus*,<sup>10</sup> *Phyllocosmus*,<sup>11</sup> and *Sarcotheca*.<sup>12</sup> In this latter work, the number of genera in *Linacæ* was then raised to fourteen. In reviewing them lately,<sup>13</sup> we had added to the family one more *Humiri*,<sup>14</sup> a genus formed by us from all the *Humiriaceæ*<sup>15</sup> yet known, and which at the first glance seems clearly distinguished from the Flaxes, from which it is separated by all other authors. But thanks to the numerous gradation of types which some or other of the *Hugoniæ* represent among them, on one side the *Erythroxyleæ*, and on the other the *Ixonantheæ*, connect them so naturally that it is better, we think, to attach the *Humiri* to this family than to place them alone. But while

<sup>1</sup> In Hook. *Lond. Journ.* vi. 588; vii. 165, 473.

<sup>2</sup> ENDL. *Gen.* 1420.

<sup>3</sup> *Gen.* 241, Ord. 34 (*Linacæ*).

<sup>4</sup> *Erythroxyleæ* K. *Nor. Gen. et Spec.* v. 175 (1824).—DC. *Prodr.* i. 573, Ord. 38.—ENDL. *Gen.* 1065, Ord. 229.—*Erythroxyleæ* LINDL. *Veg. K  ndg.* 391, Ord. 140.

<sup>5</sup> *Hugoniæ* PL. *loc. cit.* vi. 593.—*Hugoniaceæ* ENDL. *Gen.* 1016.

<sup>6</sup> PL. *loc. cit.* vi. 141 (1847).

<sup>7</sup> JACK ex Hook. *Bot. Mag. Comp.* i. (1835).

<sup>8</sup> *Ixonantheæ* (Gen. dub. *Cedrelac  is* aff. ENDL. *Gen.* 1055;—*Ternstroemiacearum* gen. LINDL.

*Veg. K  ndg.* 397).

<sup>9</sup> PL. *op. cit.* vi. (1847).

<sup>10</sup> BENTH. in Hook. *Lond. Journ.* ii. (1843).

<sup>11</sup> KL. in *Abh. Ak. Berl.* (1856).

<sup>12</sup> *Mus. Ludg.-Bat.* i. (1851.)

<sup>13</sup> In *Adansonia*, x. 368-371 (1873).

<sup>14</sup> *Aubl. Guian.* 564 (1775).

<sup>15</sup> *Humiriaceæ* MART. *Nor. Gen. et Spec.* ii. 147 (1826).—A. JUSS. in A. S. H. *Fl. Bras. Mer.* ii. (1829), 87.—ENDL. *Gen.* 1039, Ord. 222.—LINDL. *Introd.* ed. 2, 103; *Veg. K  ndg.* 447, Ord. 164.—H. BN. in *Adansonia* ii. 208; in *Payer Fum. Nat.* 262, Fam. 122.—B. H. *Gen.* 246, Ord. 35.

we propose this addition, we much reduce the number of other genera and even that of the tribes. *Durandea* and *Sarcotheca*, better known, and made sections of the genus *Hugonia*, serve as a connection between *Hugoniew* and *Ixonanthea*, hence made one; and *Hebepetalum* itself, connected to the old *Hugonius* by means of oceanic species, disappear from the group *Erythroxyloea*. On the other hand we have united *Phyllocosmus* to *Oechthocosmus*; and in the series *Lineæ* we have, after the example of some authors, ancient and modern, attached to *Linum* as sub-genera, *Reinwardtia*, *Cathartolinum*, and *Radiola*, thus reducing the total number of genera in *Linaceæ* to eight, subdivided into four series, whose general characters are as follow:

1. LINEÆ.—Corolla contorted and fugacious. Two verticels of stamens, only one of which is fertile, with alternate pieces. Fruit capsular, septicidal, or dry, indehiscent, monospermous. Herbaceous or suffrutescent plants.—2 genera.

2. HUGONIEÆ.—Corolla contorted or imbricated. Two or more verticels of stamens, all fertile, hypogynous (*Euhugoniew*), or slightly perigynous (*Ixonanthea*). Fruit drupaceous, with several stones. Trees or shrubs, sometimes climbing and often provided with hooks, leaves alternate with lateral stipules or none.—3 genera.

3. ERYTHROXYLEÆ.—Corolla contorted or imbricated, with petals lined inside with a well developed prominent rib, or oftener with a superior bilobed appendage. Two verticels of stamens all fertile. Ovary plurilocular, almost always with only one fertile cell. Fruit drupaceous, with mesocarp often thin, and one stone uni- or plurilocular. Shrubs with alternate or opposite leaves, with intra-axillary or interpetiolar stipules.—2 genera.

4. HOUMIRIÆ.—Corolla contorted or imbricated, with free petals, non-appendiculate. Stamens 10-∞, all fertile or partly sterile; anthers with connective often thick, pyramidal, or conical, with cells often but little developed at the base. Disk hypogynous of varied form. Ovary with several fruitful cells. Fruit drupaceous, with plurilocular stone very thick. Trees and shrubs with alternate exstipulate leaves.—1 genus.

Thus limited, this family contains about a hundred and seventy-five species, of which more than eighty belong to the *Lineæ* series, and some fifty to *Erythroxyloea*. The *Houmiriæ*, containing some twenty species, would be entirely American, if one had not been recently

discovered in tropical Western Africa. The *Anisandenias* have only been observed in the mountains of India; *Ixonanthes* in tropical South-Western Asia. *Anculophus* is from tropical Western Africa. The genera *Erythroxylon*, *Hugonia*, *Ochthocosmus*, and *Linum* are common to both worlds. In counting the species of these four genera, we find in all about twenty-three American to ninety-four belonging to the old World. In the genus *Linum*, the species are very unequally spread in all regions of the globe,<sup>1</sup> but they are met with from the tropical zones to the coldest regions of North America, Asia, and Europe, and also from the South of Africa to New Zealand. The common Flax is cultivated in cold and in warm regions, as in Egypt, where it is possible to water it. Its culture on the banks of the Nile is most ancient, since we find it in the stuffs which wrap the mummies and in the hypogeum paintings. The Hebrews, Celts, and Germans planted it to make cloth. Its name would seem to point to temperate Europe as the place of its origin;<sup>2</sup> yet it has been said to be of Eastern origin,<sup>3</sup> and also to grow spontaneously in Central Russia and towards the Caspian Sea.<sup>4</sup> It appears in its wild state South of the Caucasus. *L. Radiola* grows in the Orkneys and Norway, and is found as far south as tropical Africa.<sup>5</sup> *L. catharticum* spreads through all Europe, from Southern Italy to Iceland; *L. gallicum*, from France to Abyssinia;<sup>6</sup> the last has been introduced into Australia.<sup>7</sup>

The affinity of the *Linacæ* with the *Geraniacæ* is so close that some authors have united the two groups. The *Oxalideæ* have sometimes been ranged among the *Linacæ*. Of the *Linacæ*, BENTHAM and HOOKER<sup>8</sup> say, "connected by authors sometimes with the *Malvaceæ* and *Caryophylleæ*, sometimes with the *Geraniacæ*, they differ clearly from the two former families by the situation of the ovules, and from the latter by their non-lobed ovaries; and they are

<sup>1</sup> PLANCHON has given a general table of their geographical distribution and that of all the Linacæ then known (*loc. cit.* opposite page 599.)

<sup>2</sup> A. DC. *Géogr. Bot. Rais.* 390, 833.

<sup>3</sup> PL. in *Hook. Journ. loc. cit.* 135 ("verosimiliter ex Oriente ortum").

<sup>4</sup> LEDEB. *Fl. Ross.* i. 425.

<sup>5</sup> OLIV. *Fl. Trop. Afr.* i. 268.

<sup>6</sup> LECOQ. *Géogr. Bot.* v. 316.

<sup>7</sup> BENTH. *Fl. Austral.* i. 283.

<sup>8</sup> *Gen.* 241.

distinguished at a glance from the *Malvaceæ* and *Geraniaceæ* by their entire leaves, and from the *Caryophylleæ* by their alternate leaves (with the exception of two species).” These differential characters are however still too arbitrary, and they can only be artificially separated. “We can only imagine,” we have said,<sup>1</sup> “that in the *Linaceæ* the union of the carpels among themselves, according to the axis of the gynæceum, is carried further than in the *Geraniaceæ*. These are the only ones among which we observe the types with free ovaries, as in *Biebersteinia* and *Flœrkea* (*Limnanthes*), and the only ones consequently in which the style can become more or less completely gynobasic.” By the series where the genera are formed of plants with woody or frutescent stems, the *Linaceæ* are connected with certain other families, among which we find types of independent or nearly independent ovaries; these are first the *Malpighiaceæ*, then the *Euphorbiaceæ* and *Ternstræmiaceæ*. These latter have sometimes been placed with *Leonanthes*, which may have as many as twenty stamens; but we know that these are perigynous, and if we could hesitate between a woody species of *Linaceæ* and an oligandrous *Ternstræmiaceæ*, we should recall the fact that in these the stamens, otherwise free, are united with the base of the corolla, while in the *Linaceæ* it is not with the petals they unite, but, when they are not independent, which is the rule<sup>2</sup>, it is among themselves that they form a short tube or a sort of urceolum from which the free part of the filament afterwards separates. It is so in the *Hugoniæ* and *Erythroxyloæ*. In doubtful cases there remains the direction of the ovular regions, the micropyle being superior and interior in the *Ternstræmiaceæ*, but constantly exterior and capped by an obturator in the *Linaceæ*. In the *Malpighiaceæ*, the general floral organisation is nearly the same as in the woody *Linaceæ*; but they have opposite leaves, which is only the case here with *Aneulophus*; the sepals are generally furnished with one or two exterior glands; the seed is totally destitute of albumen; the embryo is not generally straight, and the ovary cells are uniovulate. This is never the case here except in *Erythroxyton*, characterised by its alternate leaves, axillary stipules, monadelphous stamens, and ovary cells generally sterile, except one. The *Euphorbiaceæ* whose

<sup>1</sup> In *Adansonia*, x. 360.

<sup>2</sup> Except in the *Hœmioricæ*.

flower has a well-developed contorted corolla with five or ten monadelphous stamens, and whose ovules are descendent, with exterior and superior micropyle capped by an obturator, are also as nearly as possible related to the *Linææ* and to certain *Hugoniceæ*; but in this case they are plants like *Jatropha*, very often milky, and always with unisexual flowers, and uniovulate ovary cells, a tri-coccate fruit, and an abundant albumen in the seeds. The *Houmiriceæ* are frequently, but not always, characterised by the form of the anthers, and they have been compared to the *Ebenaceæ*<sup>1</sup> and to the *Meliaceæ*, with uni- or biovulate cells; but from the former they are clearly distinguished by their polypetalous corolla, their præ-floration, their ovules with superior and exterior micropyle, and their drupes with thick hard stone; and from the latter by their stamens not being united in a tube which is often elongated, and by their leaves being always simple.<sup>2</sup>

The most useful of these plants is, without dispute, the cultivated Flax<sup>3</sup> (fig. 69-75). It furnishes, much more than any other species<sup>4</sup> of the genus, that textile fibre constituted by the fibrous fascicles of its liber, separated, by steeping, from the other parts of the stem and bark, and especially remarkable for its flexibility and tenacity. The seeds when ground are also of very great service, unwholesome indeed to eat, but constantly used in the preparation of poultices. From the embryo and albumen or the seeds is also extracted a drying,

<sup>1</sup> See *Adansonia*, i. 210.

<sup>2</sup> The *Houmiriceæ* have also affinities with the *Chlénaceæ*, which is explained by their relation to the *Ternstramiaceæ*, from which the *Chlénaceæ* are scarcely distinct (see *Adansonia*, loc. cit.). But we do not think they could be united to the *Ericaceæ* as proposed by LINDLEY (*Veg. Kingd.* 447).

<sup>3</sup> *Linum usitatissimum* L. *Spec.* 397.—TRATT. *Tab. t.* 144.—DC. *Prodr.* i. 426, n. 29.—MER. et DEL. *Dict. Mat. Méd.* iv. 123.—ENDL. *Enchirid.* 623.—DUCH. *Rép.* 229.—LINDL. *Fl. Méd.* 129; *Veg. Kingd.* 485.—GUIB. *Drog. Simpl.* éd. 6, iii. 651, fig. 746.—RICH. *Élém.* éd. 4, ii. 493, t. 90.—ROSENTH. *Syn. Pl. Diaphor.* 892.—REV. in *Fl. Méd. du XIX<sup>e</sup> Siècle*, ii. 239.—CAZ. *Pl. Méd. Ind.* éd. 3, 589.—II. Bx. in *Dict. Encycl. Sc. Méd.*

*sér.* 2, ii. 596.—BENN. *Om. Lins Plant* (Stockh. 1738).—BERCK. *Natr. sokns Lin-såde* (Ups. 1753).—KALM. *Om det gröna Lin.* (Vicenz. 1783).—GADD. *Anm om Lin-och* (Abo. 1786).—TRECCO. *Coll. e gov. del Lino.* (Vicenz. 1792).—NAG. *Unterr. zum Leinbau.* (Münch. 1831).—VEIT. *Ant. zum Leinbau.* (Augsb. 1841).—BAKER, *Fl. Maurit.* 35.—L. *arvense* NECK. *Gall.* 159.—L. *sativum* BLACW. *Herb. t.* 160.

<sup>4</sup> Textile fibres are also prepared from the stems of *L. austriacum* L., *maritimum* L., *gerenne* L. (*Lin de Sibérie*), *anglicum* L., et *humile* MILL. en Europe, *Lewisii* PURSH. In North America. (Upon the stem structure of the Flaxes, see LINK. *Elem. Phil. Bot.* (1837), t. 2.—REISS. *Die Fasergew. des Leines* (extr. *Denkschr. Akad. Wissensch. Wien*, c. icon.).

laxative, combustible oil used constantly in the arts in painting, in the preparation of the colours, varnish, printer's ink, etc. The abundant mucilage obtained by the contact of their outer coats with water is also much used medicinally, both externally and internally.<sup>1</sup> The purgative Flax,<sup>2</sup> a species common in damp meadows, owes its name to its evacuant properties. Its leaves have a slightly salt and bitter taste. It was much used formerly, especially for obstinate rheumatism, but is not much regarded now. In Chili, *Linum aquilinum*<sup>3</sup> is used as a cooling febrifuge. In Peru, *L. seluginoides*<sup>4</sup> is considered aperient, bitter, stomachic. The Flaxes are much cultivated in our gardens and green-houses for their pretty red, yellow, white, or blue flowers, especially *L. grandiflorum*, *perenne*, *trigynum*, and many others. The *Hugonias* seem to have very different properties. In India, the root of *H. Mystax*<sup>5</sup> is crushed and employed externally in cases of inflammation, especially those caused by venomous snake bites. The bark is also alexipharmic. Internally, the whole plant is prescribed as a vermifuge, diuretic, and sudorific, tonic, and stimulating. The root has the odour of violets. *H. serrata*<sup>6</sup> (fig. 77-79) is considered as a tonic and sudorific in the Mascareigne Islands. The *Houmiri* are also stimulating plants, on account of the resinous balsamic juice contained in several of them. AUBLET compares that which is obtained in Guiana from *H. balsamiferum*<sup>7</sup>, and which bears the name of *Houmiri* and *Touri*, to the balm of Peru, on account of its qualities. The Caribees use it in the treatment of tape-worm, and for blennorrhæa. They prepare liniments from it which are applied to inflamed or painful joints. In Peru *H. floribundum*<sup>8</sup> enjoys a similar reputation; its juice or *balsamo*

<sup>1</sup> The seeds of *L. perenne* also yield oil, and it can also be extracted it is said from those of *L. catharticum*.

<sup>2</sup> *L. Spec.* 401.—SCHKUH, *Handb.* i. t. 87.—BLACKW. *Herb.* t. 368.—DC. *Prodr.* n. 46.—LINDL. *Fl. Med.* 129.—ENDL. *Enchirid.* 623.—CAMER. *Biga Bot.* (Tab. 1712).—SLEV. *De Lino Sylv. Cath. Angl.* (Jena, 1715).—MOR. *De Lini Cath. vi Purgat.* (Dorp. 1835).—PAGENST. *Ueb. Lin. Cath.* (Münch. 1845).—ROSENTH. *op. cit.* 893.—CAZ. *loc. cit.* 593.—*Cathartolimum pratense* REICH.

<sup>3</sup> MOLIN. *Chil.* 126.—DC. *Prodr.* n. 13.—FEUILL. *Per.* iii. 32, t. 22, fig. 2.—ROSENTH. *op. cit.* 894.—*L. Chamissonis* SCHIBDE (Yango of the Chilians).

<sup>4</sup> LAMK. *Diet.* iii. 525.—DC. *Prodr.* n. 9.—A. S. II. *Fl. Bras. Mer.* i. 131.—LINDL. *Fl. Med.* 129.

<sup>5</sup> *L. Spec.* 944.—RHEED. *Hort. Malab.* ii. 29, t. 29.—DC. *Prodr.* i. 522, n. 1.—ENDL. *Enchirid.* 529.—LINDL. *Veg. Kingd.* 489.—ROSENTH. *op. cit.* 736.

<sup>6</sup> LAMK. *Diet.* iii. 149.—DC. *Prodr.* n. 2.—*H. Mystax* CAV. *Diss.* iii. 177, t. 73, fig. 1 (nec L.)

<sup>7</sup> AUBL. *Guian.* i. 564, t. 225.—DC. *Prodr.* i. 619.—LINDL. *Fl. Med.* 159.—*Myrodendron amplexicaule* W. *Spec.* ii. 1171.

<sup>8</sup> MART. *Nov. Gen. et Spec.* ii. 145, t. 199.—LINDL. *Fl. Med.* 159; *Veg. Kingd.* 447.—*Helle-via floribunda* MART. (ex ROSENTH. *op. cit.*).



de *Umiri* has an agreeable odour of benzine. It is used for the same purpose as the resinous oil of Copahu. In Brazil the seeds of *H. obovata*<sup>1</sup> are eaten, and in Gabon the fruits of *Djouga* or *H. gabonensis*.<sup>2</sup> Nothing is more open to controversy than the mode of action of the *Erythroxylons*, of which the most celebrated is *E. coca*<sup>3</sup> (fig. 80-87), a Peruvian species, cultivated in a great part of South America, especially in Columbia, Bolivia, and Brazil, for its leaves, of which the consumption is such that the production in Bolivia and Peru is valued at 15 millions of francs yearly. These leaves are oval or oval-acute, entire, membranous, penninerved, about 4 centim. (1 inch) long, and remarkable as having a middle zone of a darker colour than the rest of the limb seen on the inferior face and limited by two curved lines parallel to the edges. Their active principle is said to be *cocaine*, a crystallizable alcaloid, soluble in alcohol and ether. The leaves are used in preparing infusions, decoctions, syrups, and have been reckoned, like tea, coffee, etc., among those substances which preserve, or prevent waste in, the tissues of the body. Their action upon the nervous system has been compared to that of wine. The natives use them alone, or mixed with lime or tobacco, as a masticatory to sustain strength during journeys, works of transport, agricultural labour, or when working in mines, and can then support fatigue even when forced for a long time to go without food or drink. The plant is, moreover, among certain Indians the object of a kind of superstitious worship, and when chewed with tobacco produces a kind of intoxication similar to that produced by haschisch. In Europe, the *Coca* has been considered as assisting nutrition, as anæsthetic to the buccal and stomachic mucous, as accelerating salivary, intestinal, and even renal secretions; as useful in cases of stomatite, chronic quinsy, and uric and serofulous diathesis; it has also been much valued as a remedy for extreme embonpoint, etc. From two years of age the young stems of *Coca* yield a first harvest in the Andes, and each

<sup>1</sup> *Humirium obovatum* MART. (ex ROSENTH. loc. cit.).

<sup>2</sup> H. BN. in *Adansonia*, x. 368.—*Aubrya gabonensis* H. BN. in *Adansonia*, ii. 266.—OLIV. *Fl. Trop. Afr.* i. 275.

<sup>3</sup> LAMK. *Diet.* ii. 393.—CAV. *Diss.* viii. 402, t. 229.—DC. *Prodr.* i. 575, n. 23.—LINDL. *Fl. Med.* 199; *Veg. Kingd.* 391.—MER. et DEL.

*Diet. Mat. Méd.* iii. 148.—GUIB. *Drog. Simpl.* éd. 6, iii. 595.—DUCH. *Rép.* 197.—ENDL. *Enchirid.* 559.—HOOK. *Comp. to Bot. Mag.* i. 161; ii. 25, t. 21.—GOSSE, *Mon. E. Coca* (Brux. 1832).—TR. et PL. in *Ann. Sc. Nat.*, sér. 4, xviii. 338.—ROSENTH. *Syn. Pl. Diaphor.* 775.—REV. in *Fl. Méd. du XIX<sup>e</sup> Siècle*, i. 356 (vulg. *Hayo, Ipadu*).

year the leaves are gathered three times, in March, July, and October.<sup>1</sup>

Other species of the genus *Erythroxylon* are less used. In New Granada, *E. hondense*<sup>2</sup> and *arcolatum*<sup>3</sup> are mentioned as tonic medicaments, the buds, young shoots, and bark being used. The fruits contain an acidulate, sweet, and mucilaginous juice, which is used in preparing a diuretic and purgative syrup prescribed for cutaneous affections. In Brazil, *E. suberosum*<sup>4</sup> has an astringent bark producing a reddish brown dye. A decoction of the roots of *E. campestre*<sup>5</sup> is used in the same countries as an evacuant. The bark of the root of *E. anguifugum*<sup>6</sup> is considered an alexipharmic. Most of the species have a bright red wood; that of *E. hypericifolium*<sup>7</sup> is the *Bois d'huile* (Oil wood), or *de dames* (ladies wood), or *à balais* (broom wood) of the Mauritius which is used in cabinet work; brooms are really made from the branches.

<sup>1</sup> See especially for the history and properties of the *Coca*: DE JAUCOURT, *Encycl.* iii. 557.—A. L. JUSS. in *Diet. Sc. Nat.* ix. 487.—COCHET, in *Journ. Chim. et Pharm.* viii. 475.—PÉREZ, *Reis.* ii. 209.—MART. in *Abh. Akad. Wissensch. Münch.* iii. 326, 367.—TSCHUDY, *Reis. Per.* ii. 299.—BIBRA, *Die narkot. Genusss.* 151.—MANTEGAZ, *Sull. Virt. Igien. et Med. della Coca* (Milan, 1859).—NIEM. in *Viert. für Prakt. Pharm.* ix. fasc. 4.—WÖHLER et HEINDIG, *Ueb. das Cocaïn* (Vienne, 1860), in-8.—SCHEZER, *Ueb. d. Peruan. Coca* (Stuttg. 1860).—DEMARLE, *Ess. sur la Coca* (thès. Par. 1862).—REIS. in *Bull. Thérap.* lxx. 175.—LIPPMANN, *Ess. sur la Coca* (thès. Strasb. 1868).—MORENO, *Rech. Chim. et Phys. sur l'E. Coca.* (thès. Par. 1868).—GAZEAU, *Nouv. Rech. sur la Pharm. du Coca* (thès. Par. 1870).—M. A. FUENTES, *Mém. sur la Coca du Pérou* (Par. 1866, Icon.).—POSADA-ARANGO, in

*Ab. Médic.* xxviii. 55.

<sup>2</sup> H. B. K. *Nov. Gen. et Spec.* v. 176.—DC. *Prodr.* n. 7.—ROSENTH. *op. cit.* 775.—LINDL. *Veg. Kingd.* 391.—TR. in *Ann. Sc. Nat.* sér. 4, xviii. 340.

<sup>3</sup> L. AMÆN. v. 397.—SW. *Obs.* 184.—DC. *Prodr.* n. 20.—AINSL. *Mat. Méd. Ind.* ii. 422.—*E. carthagenense* JACQ. *Amer.* 134, t. 187, fig. 1.

<sup>4</sup> A. S. H. *Pl. Us. Bras.* t. 69, (*Gallinha Choca, Mercurio do Campo*). L'E. *tortuosum* MART. (vulg. *Fruta de pomba*) has the same properties.

<sup>5</sup> A. S. H. *Fl. Bras. Mer.* i. 97.—ROSENTH. *op. cit.* 776 (*Cabella de negro*).

<sup>6</sup> MART. ex ROSENTH. *loc. cit.* 776.

<sup>7</sup> LAMK. *Dict.* ii. 394.—CAV. *Diss.* viii. 400, t. 230.—DC. *Prodr.* n. 1.—VENELIA COMMERS. herb. (ex DC.).—Upon the structure of the stems of *Erythroxylon*, see MART. *Beitr. loc. cit.* 12.

## GENERA.

## I. LINEÆ.

1. **Linum** L.—Flowers hermaphrodite regular, 4, 5-merous; receptacle convex. Sepals entire or more rarely 3-dentate, imbricate. Petals often cohering at margin, contorted, fugacious, sometimes ligulate. Stamens double in number to the petals, 2-seriate; the oppositipetalous sterile, dentiform or setiform; all the filaments connate at base in a short tube; anthers introrse, 2-rimose. Glands 4, 5, alternipetalous, adnate to outside of staminal tube more or less prominent, equal or more rarely unequal. Germen free; cells 3-5, oppositipetalous, by spurious dorsal dissepiments more or less deeply 2-locellate; style terminal, afterwards 3-5-partite, branches stigmatiferous at apex, linear or variously dilated or capitate. Ovules in cells 2, collaterally descendent; micropyle extrorse superior, blocked by thick obturator. Capsule septicidal 3-5-valved; cells imperfectly septate, 2-spermous; or sub-completely divided by septa 6-10-coccate; cocci 1-spermous. Seed descendent; albumen scanty, oily; embryo straight, fleshy; radicle superior.—Herbs, undershrubs or shrubs, usually glabrous; leaves alternate or more rarely opposite, entire or serrate; stipules small, caducous, sometimes glanduliform or 0; flowers disposed in terminal or axillary cymes, often corymbiform or racemiform, rarely 2-chotomous 2-parous, usually laterally 1-parous. (*All temperate and extra-tropical warm reg. and tropical-mount.*). See p. 42.

2. **Anisadenia** WALL.—Flowers nearly of *Linum*, 5-merous, exterior sepals 2, 3, dorsal 1, 2-seriate glandular-setiferous. Glands adnate to exterior of staminal tube, 3-6, unequal; one often larger. Germen 3-locular; cells 2-ovulate. Other characters of *Linus*. Capsule oblong, membranous (indehiscent?), usually 1-

spermous; seed scantily albuminous; embryo straight (green); cotyledons plano-convex; radical short superior.—Herbs; rhizome perennial; leaves alternate, membranous, penninerved, serrate; stipules intrapetiolar, adpressed, striate; flowers in terminal racemes, sometimes simple, more rarely cymiferous; pedicel short, reflexed after anthesis. (*Mountainous India.*) See p. 45.

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## II. HUGONIEÆ.

3. **Hugonia** L.—Flowers regular, 5-merous; receptacle convex. Sepals imbricate, acute or obtuse. Petals alternate, contorted, or imbricated, often fugacious, sometimes more or less thickened at base or inwardly rather prominent-costate, exterior usually glabrous, interior scantily or sometimes more richly pubescent villose. Stamens 10, 2-seriate, all fertile; filaments connate at base in a short tube, outwardly naked, or between the petals more or less glandular-thickened; anthers introrse, 2-rimose. Germen superior; cells 3-5, alternipetalous; style 5-partite; branches stigmatiferous at apex, more or less thickened; ovules in each cell 2, descendent, sub-superposed or oftener collateral; micropyle extrorse superior, blocked by thick obturator. Fruit drupaceous, more or less fleshy; putamens 3-5, ligneous or osseous, 1, 2-spermous; seed descendent; albumen fleshy; embryo straight or curved; cotyledons foliaceous.—Trees or shrubs, sometimes scandens; leaves alternate, penninerved, entire or serrate, glabrous or tomentose; stipules small, generally caducous; flowers in simple composite-cymiferous racemes, terminal or axillary, sometimes shortly subsessile; peduncle bracteate or naked; the 1, 2 most inferior or its branches changed into spiral recurved hooks. (*All trop. reg.*) See p. 46.

4. **Ochthocosmus** BENTH.—Flowers nearly of *Hugonia*; petals persisting round fruit, more or less rigid or indurate. Stamens 5, surrounded at base with very short glandular ring. Germen 3-5-locular; cells 2-ovulate, undivided or more or less deeply 2-locellate by spurious septa; style simple, stigmatiferous at apex, very shortly 3-5-lobed. Capsule septicidal 3-5-valved; carpels more or less septate. Seeds 1, 2, variously appendiculate or winged; embryo scantily albuminous...? Glabrous shrubs; leaves alternate,

subcoriaceous, entire, serrate or crenate; stipules minute, caducous; flowers in cymes or glomerules axillary to branches. (*Western Africa, trop. South America.*) See p. 48.

5. **Ixonanthes** JACK.—Flowers nearly of *Hugonia*; receptacle shortly cupuliform, provided with an interior disk more or less conspicuous. Sepals 5, more or less connate at base, and petals same in number, alternate, contorted, persistent, and indurate, perigynously inserted at margin of receptacle. Stamens 10–20, inserted with perianth, eglandular; anthers introrse, 2-rimose. Germen free, partly inferior; cells 5, alternipetalous, undivided or more or less falsely 2-locellate; ovules 2 in each, descendent, micropyle extrorse, superior elongate; style simple, capitate, sub-5-lobed or widely discoid stigmatiferous at apex. Capsule coriaceous or ligneous, septicial; valves inwardly open, sometimes spuriously septate; seeds with long funicle appended, exostome much elongate, membranous or wing shaped, and attended by 2 lateral wings; albumen fleshy; radicle of eccentric embryo, superior.—Glabrous trees or small trees; leaves alternate subcoriaceous, entire, or remotely crenate or serrate, reticulate penninerved; stipules minute or 0; flowers in long axillary pedunculate cymes. (*Trop. Eastern Asia.*) See p. 48.

### III. ERYTHROXYLÆ.

6. **Erythroxylon** L.—Flowers hermaphrodite, 5- or more rarely 6-merous; sepals free or connate at base, subvalvate or more usually imbricate, persistent. Petals hypogynous, imbricate, or contorted, deciduous, furnished inside with an erect tongue much varied in form, usually concave at base, and at apex laterally 2-lobed corrugate-plicate. Stamens double in number to the petals, 2-seriate; filaments connate at base in a short tube, outwardly naked or more or less glandular, where they become free, often encircled with a prominent ring formed by upper part of tube; anthers 2-locular, introrsely or extrorsely rimose. Germen free, 2–4-locular; cells 1–3 rudimentary or abortive; ovules in fertile cell 1 (more rarely 2), descendent; micropyle extrorse superior, blocked by rather thick obturator; styles 3, 4, free or more or less high connate, capitate or clavate stigmatiferous at apex. Fruit drupaceous, usually surrounded by base of calyx; putamen hard or papyraceous,

1-spermous ; testa of descendent seed thin ; albumen farinaceous or fleshy, copious, scanty or 0 ; cotyledons of straight embryo, plano-convex ; radicle terete superior.—Glabrous or more rarely rather pubescent shrubs ; leaves alternate, simple, entire ; stipules intrapetiolar (in exceptional cases often imbricated or aphyllous) ; flowers in axils of leaves, sometimes in scales of aborted ones), cymose or solitary. (*All hot regions trop. and subtrop.*) See p. 49.

7. **Aneulophus** BENTH.—Flowers nearly of *Erythroxyton* ; petals 5, traversed by interior prominent rib, deciduous. Stamens 10 (of *Erythroxyton*). Germen 3, 4-locular ; styles 3, 4, more or less high connate, stigmatiferous subclavate at apex ; ovules in each cell 2, collaterally descendent. Drupe ; putamen 1-4-locular, 1-4-spermous ; seeds...?—A glabrous shrub ; leaves opposite entire ; stipules intrapetiolar short, connate ; flowers axillary cymose ; pedicels very short, bracteolate at base. (*Trop. W. Africa.*) See p. 51.

#### IV. HOUMIRIÆ.

8. **Houmiri** AUBL.—Flowers regular hermaphrodite ; receptacle short convex. Sepals 5, free or connate at base, imbricated more rarely connate in calyx high gamophyllous or very shortly 5-dentate. Petals same in number, alternate, contorted or imbricated, deciduous. Stamens 10-∞, all fertile, or the alternate sterile, connate at base or more rarely free ; anthers introrse sometimes versatile ; cells rather large with connective scarcely or more or less long apiculate, or more usually smaller, and remotely inwardly at base, adnate to thick fleshy compressed subconical or subpyramidal connective, longitudinally rimose. Germen free, surrounded at base by hypogynous annular or cupular disk, subentire truncate, dentate, lobed, or composed of linear distinct glands ; cells 5, alternipetalous, or more rarely 6-8 ; style simple, stigmatiferous at apex usually slightly dilated, entire or minutely dentate. Ovules in cells 1, 2 descendent ; funicle unequal ; micropyle extrorse superior. Fruit drupaceous, flesh often thin or coriaceous ; putamen ligneous or very hard bony, often resinous-pitted within. Seeds in cells solitary or 2-nate, and separated obliquely by a septum ; albumen fleshy ; superior radicle of straight embryo, often longer than cotyledons. (*South trop. America, trop. West-Africa.*) See p. 51.

## XXXVIII. TREMANDRACEÆ.

In the genus *Tremandra*, which has given its name to this small family, there was one species tolerably distinct from the others by its exterior characters known as *T. verticillata*<sup>1</sup> (fig. 98-103). Of

*Platytheca verticillata*.



Fig. 99. Flower ( $\frac{3}{4}$ ).

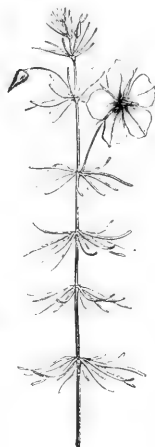


Fig. 98. Floriferous branch.



Fig. 100. Diagram.

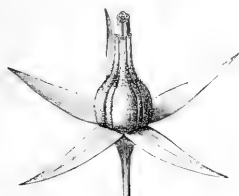


Fig. 101. Flower without the corolla.

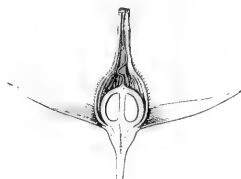


Fig. 102. Long. antero-posterior sect. of flower without the corolla.

this, a separate genus has been made under the name of *Platytheca*,<sup>2</sup> which may be studied as the type, as it has regular pentamerous flowers with two verticels to the androceum. The receptacle is convex; the sepals free and valvate; the petals alternate valvate-induplicate. Of the ten hypogynous free stamens, five are superposed to the sepals, and five more exterior and smaller to the petals.

<sup>1</sup> HUEG. *Par. Tindob.* fasc. 14, t. 73 (ex WALP. *Ann.* i. 77).—PAYER, *Organog.* 134, t. 29.—*Tetralthea verticillata* PAXT. in *Mag. of Bot.* xiii. 171, fig.—*Platytheca galioides* STEETZ, in *Pl. Preiss.* i. 220.—BENTH, *Fl. Austral.* i. 136.—

*P. Crucianella* STEETZ, *op. cit.* 221.—*P. crassifolia* STEETZ, *op. cit.* 222.

<sup>2</sup> STEETZ, *loc. cit.* 220.—ENDL. *Gen.* n. 56441.—LINDL. *Veg. Kingd.* 374.—B. H. *Gen.* 134, n. 2.—H. BN. in *Payer Fam. Nat.* 308.

All are formed of a filament and a continuous anther, dehiscing by an apical pore situated quite at the top of the apex elongated into a rostrum. There are four cellules to the anther all

*Platytheca verticillata.*



Fig. 103. Gynæceum (?).

situated in the same vertical plane.<sup>1</sup> The gynæceum is free, formed of an ovary with two cells, one anterior the other posterior, surmounted by a slender style with truncate stigmatiferous apex. In the inner angle of each cell is a placenta supporting a descendent anatropous ovule with exterior and superior micropyle.<sup>2</sup> The fruit is a bi-locular capsule, compressed, loculicidal, then septicidal. The seeds contain under their coats a fleshy albumen surrounding a small axile embryo with superior radicle. The only *Platytheca* known is a delicate shrub, a native of Australia, as are all the species of this family. Its leaves are verticillate<sup>3</sup> and linear; the flowers<sup>4</sup> are axillary solitary and pedunculate.

The true *Tremandras*,<sup>5</sup> of which two species<sup>6</sup> are known, are but slightly distinct from *Platytheca*; their stamens, the anthers of which are said to be articulate at the summit of a tenuous filament, with only two cells, are separated from each other by five oppositipetalous glands of a disk within which are inserted the stamens alternate to the sepals. The seed is provided on a level with the chalaza with a fleshy appendage in the shape of a curved horn spirally rolled,<sup>7</sup> and the ovary cells are generally biovulate. —They are shrubs covered with stellate hairs, with opposite dentate membranous leaves.

The *Tetrathecas*<sup>8</sup> have tetramerous or pentamerous rarely trimerous flowers.<sup>9</sup> The androceum is diplostemonous; but the stamens,

<sup>1</sup> They open above to a narrow channel situated in the direction of the apical rostrum.

<sup>2</sup> With double coat.

<sup>3</sup> Generally eight in number. Below, the axis which supports them presents a circular crenulate ring.

<sup>4</sup> Violet pretty large.

<sup>5</sup> R. BR. in *Flind. Voy. App.* ii. 544.—DC. *Prodr.* i. 344.—ENDL. *Gen.* n. 5645.—B. H. *Gen.* 134, n. 3.—H. BN. in *Payer Fam. Nat.* 308.

<sup>6</sup> BENTH. *Fl. Austral.* i. 136.—WALP. *Ann.* vii. 242.

<sup>7</sup> It is an arillate production of the same

nature as those named strophioles, and is due to the hypertrophia of the outer coat here taking the same form as in some *Ochnaceæ* and the New Caledonian *Tiliaceæ* of the genus *Triscuspidaia*.

<sup>8</sup> SM. *Nov.-Holl.* i. t. 2; *Exot. Bot.* i. 37, t. 20-22.—J. *Mém. Mus.* i. 387.—TURP. in *Diet. Sc. Nat. Atl.* t. 175.—DC. *Prodr.* i. 343.—ENDL. *Gen.* n. 5644.—LINDL. *Veg. Kingd.* 374, fig. 260.—PAYER, *Organog.* 137, t. 30.—B. H. *Gen.* 134, n. 1.—H. BN. in *Payer Fam. Nat.* 308.

<sup>9</sup> Rose coloured or purple.



distinctly arranged at all ages in one verticel, are grouped in pairs enveloped by each petal, its edges being folded inwards. The non-articulate anthers have two cells or four cellules arranged in two rows. The gynæceum, fruit, and arillate seeds are the same as in *Tremandra*; they have as many as four ovules<sup>1</sup> in each cell and are generally destitute of disk. Some twenty species have been described,<sup>2</sup> glabrous or glandular with alternate opposite or verticillate leaves.

This small group<sup>3</sup> has often been considered as representing the regular form of the *Polygalaceæ*<sup>4</sup>; and this was the opinion of R. BROWN. Others connect it rather with *Lasiopteleæ*, which the true *Tremandras* really resemble much in aspect and foliage and by their stellate hairs, but are very clearly distinguished from them by the præfloration of the corolla and the organisation of the androecium and gynæceum. There is also believed to be an affinity between the *Tremandras* and the *Cheirantheras*<sup>5</sup> of the group *Pittosporææ*. The *Tremandrææ* seem to us placed between the *Polygalaceæ* on one side, having the same gynæceum and nearly the same androecium and from which they are separated by the regularity of the flowers; and the *Linacææ* on the other, having their regular corolla, diplostemous androecium, capsular fruit, the same direction of the regions of the ovule, and from which they are separated by their mode of præfloration, the fewer number of ovary cells, and the difference in the consistence of the albumen. All the *Tremandrææ* described, twenty in number, are extra-tropical Australian; they have no known property. *Platythea verticillata* (fig. 98-103) and several *Telrathecas* are valued in our green-houses as pretty ornamental plants.

<sup>1</sup> In the species from the south-west of Australia; those from the east have but one or two. Beside the prolongation of the region of the chalaza, the ovule presents a slight thickening of the exostome often capped by a small obturator (as in the *Euphorbiacææ*). The ovules may be nearly collateral, three in number. The seeds are covered with hairs in the Eastern species.

<sup>2</sup> LABILL. *Pl. Nouv.-Holl.* i. 95, t. 122, 123.—REICHB.  *Ic. Erot.* t. 78.—RUDG. in *Trans. Linn. Soc.* viii. t. 11.—ENDL. in *Hueg. Enum.* 7.—HOOK. *Icon.* t. 268.—HOOK. *F. Fl. Tasm.* t. 7.—STEETZ, in *Pl. Preiss.* i. 212.—BENTH. *Fl. Austral.* i. 129.—LINDL. in *Mitch. thr. Exp.* ii. 206; *Soc. Riv. App.* 38; in *Bot. Reg.* (1844), t. 67.—WALP. *Rep.* i. 249; v. 68; *Ann.* ii. 87;

iv. 241; vii. 241.

<sup>3</sup> *Tremandrææ* R. BR. *Gen. Rem.* (1814), 544; *Misc. Works*, ed. BENN. i. 15.—ENDL. *Gen.* 1076, Ord. 232.—DC. *Prodr.* i. 343, Ord. 19.—B. H. *Gen.* 133, Ord. 232.—*Tremandrææ* LINDL. *Veg. Kew.* d. 384, Ord. 132.

<sup>4</sup> It constitutes with *Polygalaceæ*, the class *Polygalinææ* of ENDLICHER.

<sup>5</sup> They are doubtless more apparent than real, the organisation of the gynæceum being quite different, and depending upon the analogy of the form and colour of the perianth. The androecium of the *Cheirantheras* is also very different from that of the *Tremandræææ*. According to AGARDH (*Theor. Syst.* 190), these are "more perfect *Bertyacææ* (*Euphorbiacææ*)."

## GENERA.

**1. *Platytheca*.**—Flowers hermaphrodite regular; receptacle short convex. Sepals 5 valvate. Petals 5, alternate free, induplicate-valvate, patent, deciduous. Stamens 10, 2-seriate; the 5 exterior oppositipetalous smaller; filaments short free; anthers continuous with filament, 1-seriate, 4-locellate at apex tapering to 1-porous rostrum. Germen free, 2-locular, style entire thin stigmatiferous truncate at apex; ovule in each cell solitary descendent; micropyle extrorse superior. Fruit capsular, loculicidal and septicidal 4-valved. Seed descendent glabrous; albumen fleshy or subcartilaginous; embryo axile more or less elongate; radicle superior; cotyledons semiterete.—Delicate small shrubs; branches herbaceous; leaves verticillate ericoid exstipulate; branches incrassate below insertion; flowers axillary solitary pedunculate. (*South W. Australia*.) See p. 67.

**2. *Tremandra* R. Br.**—Flowers (nearly of *Platytheca*) 5-merous; stamens 10, 2-seriate; 5 smaller interior to a like number of oppositipetalous glands; filaments filiform; anthers “articulate,” 2-locular dehiscing by apical subvalvate pore. Germen 2-locular; cells 1, 2-ovulate. Capsule loculicidal 2-valved; seeds furnished at chalaza with strophiform cochleate contorted aril. Other characters of *Platytheca*.—Stellate-tomentose shrubs; leaves opposite, ovate, dentate; flowers axillary solitary. (*South-West Australia*.) See p. 68.

**3. *Tetratheca* Sm.**—Flowers (nearly of *Platytheca*) 4, 5-merous; stamens twice as numerous as the petals, 1-seriate, in pairs opposite the petals; anthers 2-locular or 2-seriate 4-locellate. Gynæceum of *Platytheca*; style entire or 2-fid at apex; ovules in cell 1-4 descendent. Fruit seed and other characters of *Tremandra*.—Glabrous or glandular-pilose small shrubs; leaves alternate, opposite or verticillate ericoid or plane sometimes subnail; flowers axillary solitary. (*Extratrop. Australia*.) See p. 68.

## XXXIX. POLYGALACEÆ.

### 1. POLYGALA SERIES.

The Milkworts,<sup>1</sup> (Fr. *Laitiers*) (fig. 104-106) have regular hermaphrodite flowers. Their convex receptacle supports from below

*Polygala oppositifolia.*

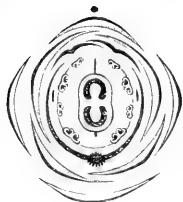


Fig. 105. Diagram.

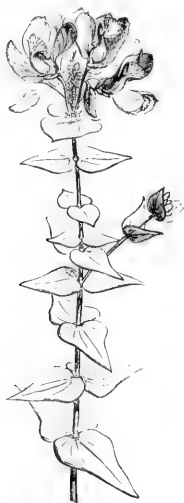


Fig. 104. Floriferous branch.

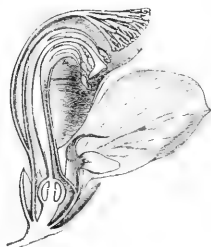


Fig. 106. Long. sect. of flower ( $\frac{1}{2}$ ).

upwards, the calyx, corolla, androecium, and gynæceum. The calyx is formed of five very dissimilar pieces, imbricated in quincuncial

<sup>1</sup> *Polygala* T. *Inst.* 174, t. 79.—L. *Gen.* n. 851.—ADANS. *Fam. des Pl.* ii. 358.—J. *Gen.* 99.—LAMK. *Dict.* v. 485; Suppl. iv. 474; *Ill.* t. 598.—DC. *Prodr.* i. 321.—TURP. in *Dict. Sc. Nat.* Atl. t. 174,—A. S. H. et Moq. in *Mém.*

*Mus.* xvii. 915, t. 27, 28; xix. 326.—SPACH, *Suit. à Buffon*, xii. 117.—ENDL. *Gen.* n. 5647.—PAYER, *Organog.* 139, t. 31.—A. GRAY, *Gen. Ill.* t. 183, 184.—B. H. *Gen.* 136, 974, n. 2.—H. Bx. in *Payer Fam. Nat.* 309.—SCHNIZL. *Iconogr.*

præfloration. The sepals 1, 2 and 3 (the two last often exterior) are but little developed, greenish and foliaceous. The sepals 4 and 5, on the contrary, covered in the bud, much larger, unsymmetrical, coloured and petaloid, are thrown out on each side of the expanded flowers and constitute thus what are termed wings. The corolla is not less irregular. It is formed of five very unequal petals, imbricated in the bud so that the two posterior cover the anterior which is generally much larger than the others. This takes the name of keel, because of its form; it is concave boat-shaped helmet-shaped or resembling a hood; the apex is entire or bi- or trilobed and often bears towards the end a dorsal crest lobed or divided in various ways. The posterior petals are small and narrow often reduced to small scales or simple or bi-lobed tongues; sometimes they are altogether wanting as are also the lateral ones still more frequently. When these latter exist (which is rarely the case), they are almost always still smaller than the posterior ones which they cover in the young bud and with which they may remain united to a variable length. The androecium is formed of eight stamens placed four on each side of the flower. The filaments are generally monadelphous and united to the petals for a variable distance in their lower part, the sheath thus formed being cleft according to the length of the posterior side of the flower. Higher up, the filaments form for a variable distance two bundles, after which each becomes free and terminates in an introrse anther, with two more or less complete cells, dehiscing by an apical opening of varied shape, single or more or less deduplicate. The hairs, variable in number, often cover the summit, but especially the base of the anther.<sup>1</sup> The gynæceum is free; accompanied at the base by an insignificant glandular disk, often irregular. It is composed of an ovary, compressed upon the sides and surmounted by a style whose stigmatiferous apex inclines towards sepal 2, bending and dilating on a level with and above its papillose surface into two or four lobes of very varied form and size.<sup>2</sup> The ovary is in two cells, anterior and

t. 233.—LEM. et DCNE. *Tr. Gen.* 329 (incl. : *Badiera* DC. *Brachytropis* DC. *Chamebuxus* DC. *Epiphizanthus* BL. *Isolophus* SPACH, *Phyllace* NOR. *Psychanthus* DC. *Salomonina* LOUR. *Scmeiocardin* HASSK. *Senega* DC. *Tricholophus* SPACH.

<sup>1</sup> The pollen, in the *Polygalaceæ* is according to H. MOHL (in *Ann. Sc. Nat.* sér. 2, iii. 326), "spherical, barrel-shaped or cylindrical, with a

great number of longitudinal folds; in water spherical, with narrow bands which contain an umbilicus (*Comesperma compactum*, twelve bands; *Mundtia spinosa*, twelve or thirteen; *Momina xalapensis*, fifteen; *Polygala Chamebuxus*, sixteen; *P. Myrtifolia*, twenty-two, also twenty-one and twenty-three."

<sup>2</sup> The posterior lobe is almost always much

posterior separated by a narrow partition supporting in each cell a descendent, anatropous ovule with micropyle looking outwards and upwards.<sup>1</sup> The fruit, generally accompanied by the persistent calyx, is a loculicidal compressed capsule of varied form,<sup>2</sup> whose descendent seeds generally contain under their coats an embryo accompanied or not by a more or less abundant fleshy albumen. The exostome presents an arillate exerescence entire or lobed. The Milkworts (Fr. *Laitiers*) are shrubs, undershrubs or herbs. The leaves are alternate, more rarely opposite or even verticillate, simple, entire or nearly so and exstipulate. The flowers<sup>3</sup> are in simple or more rarely compound racemes or in spikes sometimes short and capituliform, sometimes few flowered. Each is inserted in the axil of a bract accompanied by two lateral bracteoles often articulate at the base.

In *P. diversifolia*<sup>4</sup> and *Penaea*,<sup>5</sup> woody species from the Antilles, whose inflorescence is axillary, the lateral sepals are not much larger than the others, and the exterior petals are a little more developed than in other species of *Polygala*, for which reason they have been made a genus under the name of *Badiera*.<sup>6</sup> To the ovary, supported by a short foot, succeeds a fruit of which one cell is generally but little developed.<sup>7</sup>

In certain species, of which the genus *Chamebuxus*<sup>8</sup> has been made, the seeds have little or no albumen, and the cotyledons become thick and plano-convex; there is, as regards this, every transition

more developed than the anterior sometimes spreading into a flat concave or fimbriate sheet, etc.

<sup>1</sup> It has a double envelope, and the exostome already thickens more or less irregularly.

<sup>2</sup> Generally compressed, oval, oboval or orbicular or didymous, often emarginate membranous or sometimes, coriaceous, with cells, sometimes unequal narrower and thinner, one less fleshy than the other, especially in *Badiera*.

<sup>3</sup> White, yellow, pink, violet or purple, more rarely blue.

<sup>4</sup> L. *Amœs.* ii. 140.—P. BR. *Jam.* t. 5, fig. 3, 4.

<sup>5</sup> L. *loc. cit.*—PLUM. *Amer.* (ed. BURM.), t. 214, fig. 1.

<sup>6</sup> DC. *Prodr.* i. 334.—DELESS.  *Ic. Sel.* iii. t. 21.—A. S. H. et MOQ. in *Mém. Mus.* xvii. 351, t. 29, fig. 1.—ENDL. *Gen.* n. 5648.—GRISEB. *Fl.*

*Brit. W.-Ind.* 29.—B. H. *Gen.* 137, n. 3 (nec HASSK.).—*Penaea* PLUM. *Gen.* 22, t. 25 (nec L.).

<sup>7</sup> Perhaps it would be well to place in the same genus with the American, *Badieras*, *Acanthocladius* (KL. in *Pl. Sellow.* ex HASSK. in *Ann. Mus. Ludg.-Bat.* i. 184;—B. H. *Gen.* 974, n. 6 a), a genus proposed for *Mundia brasiliensis* (A. S. H. *Fl. Bras. Mer.* ii. 57, 92;—WALP. *Rep.* i. 245), a plant which has spinose branches, the foliage of *Badiera*, the flower of certain *Polygalas*, and, it is said, a compressed subdidymous capsule dehiscing by the edges, organised in fact like that of the Milkworts.

<sup>8</sup> DILLEN. *Nov. Gen.* t. 9.—DC. *Prodr.* i. 331 (*Polygalæ* sect. 7).—SPACH, *Suit. à Buffon*, xii. 125.—HASSK. in *Ann. Mus. Ludg.-Bat.* i. 152.—*Badiera* HASSK. *Hort. Bogor.* 227 (nec DC.). *Phylace* NOR. MSS. (ex HASSK. *loc. cit.*).—WALP. *Rep.* v. 64.

possible. Some, as *P. glaucescens* of India, have caducous sepals;<sup>1</sup> others, as *P. triphylla*, have sepals less unequal, and the stamens are sometimes not more than six in number. It is on this account that we may consider it as only a section of the genus *Polygala*, the *Salomonius*,<sup>2</sup> small Asiatic herbaceous species, which have but slightly unequal sepals, and four or, more rarely, five or six stamens. Some species are parasites, discoloured, with squamiform leaves.<sup>3</sup>

Thus constituted, this genus contains about two hundred species,<sup>4</sup> natives of all parts of the world, more abundant in warm and

*Muraltia Heisteria.*



Fig. 108. Seed ( $\times$ ).



Fig. 107. Dehiscent fruit ( $\times$ ).



Fig. 109. Long. sect.  
of seed.

temperate climates, rare in Australia, where it is confined to the tropical regions.

<sup>1</sup> It has been proposed to make a genus, *Semiocardium* (ZOLL. in *Nat. Tijds. Ned. Ind.* xvii. ex HASSK. loc. cit. i. 155).—B. H. *Gen.* 974.

<sup>2</sup> LOUR. *Fl. Cochinch.* 14.—DC. *Prodr.* i. 333. —A. S. H. & MOQ. in *Mém. Mus.* xviii. t. 29, fig. 3; xix. 330.—DELESS.  *Ic. Sel.* iii. t. 19.—WIGHT, *Ill.* t. 22.—ENDL. *Gen.* n. 5646. —B. H. *Gen.* 136, n. 1.—H. BN. in *Payer Fam. Nat.* 310.

<sup>3</sup> The genus *Epirhizanthos* has been made of them (BL. *Cat. Hort. Buit.* 25.—DC. *Prodr.* xi. 44.—MIQ. *Fl. Ind.-Bat.* i. p. ii. 127, t. 15. —HOOK. F. in *Trans. Linn. Soc.* xxiii. 158.—WALP. *Ann.* vii. 243).

<sup>4</sup> JACQ. *Fl. Austr.* t. 233, 412, 413.—AUBL. *Guian.* t. 225.—H. B. K. *Nov. Grn. et Spec.* v.

t. 506-512.—A. S. H. *Fl. Bras. Mer.* ii. 5, t. 83-89.—DELESS.  *Ic. Sel.* iii. t. 15-19, 21.—WIGHT, *Icon.* t. 67, 946.—THW. *Enum. Pl. Zeyl.* 22, 400.—HOOK. F. *Fl. Brit. Ind.* i. 200-207; in *Trans. Linn. Soc.* xxiii. 158 (*Salomonis*). —BENTH. *Fl. Hongk.* 43, 44; *Fl. Austral.* i. 138. —HARV. et SOND. *Fl. Cap.* i. 80.—GRISEB. *Fl. Brit. W. Ind.* 27.—A. GRAY, *Man.* ed. 5, 120.—CHAPM. *Fl. S. Unit. St.* 82.—C. GAY, *Fl. Chil.* i. 234.—MIQ. *Fl. Ind.-Bat.* i. p. ii. 127, t. 5 (*Epirhizanthos*).—HASSK. in *Ann. Mus. Ludy.-Bat.* i. 155.—TR. et PL. in *Ann. Sc. Nat. sér.* 4, xvii. 129.—OLIV. *Fl. Trop. Afr.* i. 125.—BOISS. *Fl. Or.* i. 468.—REICHB.  *Ic. Fl. Germ.* xviii. t. 1346-1351.—GREN. et GODR. *Fl. de Fr.* i. 194.—WALP. *Rep.* i. 231; ii. 768; v. 63; *Ann.* i. 73; ii. 79; iv. 237; vii. 243.

Beside *Polygala* are placed several very nearly allied genera, most of which were not originally separated and which have its general floral organisation. These are : *Phlebotenia*, formed of shrubs from the Antilles, whose lateral petals are independent of the keel, the superior being shorter. The lateral sepals form two large wings ; and the capsular fruit has two cells, each bordered with two vertical wings much more developed on the posterior side ; *Muraltia* (fig. 107-109), consisting of plants from South Africa whose sepals are but slightly unequal, the stamens seven or eight in number, and the capsular fruit surmounted by four horns or ribs ; *Mundtia*, native to the same country, whose lateral sepals are larger than the others, and whose fruit is drupaceous ; *Monnina*, from tropical America, with the lateral sepals dilated into wings, the upper petals connate with the staminal tube within the keel, the ovary generally reduced to one cell the development of the posterior one being arrested, and the fruit unilocular, drupaceous or dry, marginate or winged upon the edges. *Comesperma* has generally caducous sepals, and the lateral petals are united with the keel in the Australian species, and free or nearly so in the South American, the latter being named *Bredemeyera*. The capsular fruit, tapering to a long angle at the base contains seeds covered with long hairs generally forming a large pencil descending to the lower part of the cells. In *Securidaca*, to a flower like that of *Polygala*, succeeds a unilocular, samaroid fruit surmounted by a long membranous nerved wing, sometimes wide and short ; it consists of shrubs, generally climbing, from the tropical regions of both worlds.

In *Carpolobia* and *Trigonistrum*, considered by most authors as abnormal genera but still inseparable from this family, the petals are less unequal than in the preceding genera. In the former, natives of tropical Western Africa, they are united into a gamopetalous corolla, cleft above ; the lateral sepals are developed into wings ; the stamens are five in number and the fruit is drupaceous. In the latter, belonging to Malaysia, the sepals are but slightly unequal ; the petals almost independent ; the stamens five in number ; and the trilocular ovary succeeded by a dry fruit with three wings, separating finally into three samaroid carpels.

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## II. XANTHOPHYLLUM SERIES.

The flowers of *Xanthophyllum*<sup>1</sup> (fig. 110–112) are outwardly analogous to those of the *Polygalæ*, although their five sepals and imbricated petals are generally less unequal. The cymbiform keel is entire. The stamens are eight in number; they are composed of

*Xanthophyllum flavescens.*

Fig. 111. Fruit.

Fig. 110. Long. sect. of flower (½).

Fig. 112. Embryo (¾).

filaments free, or united for a variable distance among themselves or with the petals, and of bilocular, introrse anthers, dehiscing by short clefts. The stamens are placed as in the Milkworts. The gynæceum, surrounded by a more or less thick circular disk, is formed of a superior unilocular ovary, tapering above into an arched style whose swollen summit is covered with stigmatic papillæ. In the ovary are two more or less prominent parietal placentas, each bearing from two to six ovules, at first descendent, then more or less oblique in all ways, anatropous, with micropyle constantly directed towards the placenta. The fruit is a coriaceous berry, containing one or a small number of seeds whose coats cover a thick albuminous or exalbuminous embryo, fleshy cotyledons and a short non-prominent radicle. *Xanthophyllum*, which may be defined as *Polygalaceæ* with pluriovulate parietal placentas and fleshy fruit,<sup>2</sup> consists of trees and shrubs from tropical Asia and Australia. The

<sup>1</sup> ROXB. *Pl. Coromand.* iii. 82, t. 24; *Fl. Ind.* ii. 221.—ENDL. *Gen.* n. 5657.—PAYER *Fam. Nat.* 109.—B. H. *Gen.* 139, 974, n. 13.—*Jackia* BL. *Bijdr.* 60 (nec WALL.).—*Macintyria* F. MUELL. *Fragm. Phyt. Austral.* v. 8, 57.

<sup>2</sup> We should perhaps comprise in this series,

whose characters would in this case be modified, *Moutabea* (AUBL. *Guian.* 679, t. 274;—J. *Gen.* 420;—ENDL. *Gen.* n. 4265; MART. *Fl. Bras. Ebenac.* 13, t. 5, 6;—B. H. *Gen.* 140, n. 14; *Cryptostomum* SCHREB. *Gen.* n. 344;—*Aensta* R. et PAV. *Prodr.* i. t. 1; *Fl. Per.* i. 5, t.



leaves<sup>1</sup> are alternate, coriaceous, glabrous, often entire; and the flowers disposed in axillary, super-axillary or terminal racemes, simple or ramified and more or less compound. Some seven or eight species are known.<sup>2</sup>

### III. KRAMERIA SERIES.

The flowers of *Krameria*<sup>3</sup> (fig. 113–123) differ from those of all other genera in this family, as they are resupinate; they are moreover hermaphrodite and irregular. The convex receptacle bears a calyx having sometimes five sepals (fig. 122); they are imbricated in a rather varied way, but one of them, the anterior, always envelopes the two lateral, while of the two posterior one is generally enveloped while the other envelopes. But generally there are but four sepals, the anterior still enveloping and the posterior covering the two lateral; thus it is the fifth, being interior, which disappears. The corolla is only represented on the posterior side of the flower, sometimes by three petals, the middle one covered in the bud by the two lateral (fig. 119–122), sometimes by two leaves only. They are nearly free or united by a common support of variable

6, fig. a;—*Cryptostemon* W. *Spec.* ii. 106;—*Moutabea* PÆPP. et ENDL. *Nov. Gen. et Spec.* ii. 62, t. 168), whose pentamerous flowers have but slightly unequal imbricated sepals and petals with the androceum of the *Polygalca*, formed of a tube cleft behind the upper oblique opening supporting eight bilocular introrse anthers, dehiscing by a short oblique cleft into two unequal valves. But all parts of the perianth and androceum are supported by a long common tube of uncertain nature, at the bottom of which is a free ovary, with from 2 to 5 cells, surmounted by a slender flattened style irregularly dilated, stigmatiferous at the apex. In the inner angle of each cell is a descendent incompletely anatropous ovule, with exterior and superior micropyle. The globular and fleshy fruit, analogous to that of *Xanthophyllum*, contains one or more seeds lodged in pulp, whose thin coats cover a large fleshy embryo, with plano-convex cotyledons transversely oblong, a short but little prominent radicle, and a gemmula with numerous leaves,

corresponding to the middle of one of the large edges of the cotyledons. *Moutabea*, of which five species are described, all from tropical America, consists of glabrous trees, with alternate, simple, elongated thick coriaceous leaves (yellowish when dry) and with flowers (white or yellow) in racemes or short spikes.

<sup>1</sup> They are generally of a yellowish tint.

<sup>2</sup> NEES, in *Flora* (1825), 120.—WIGHT et ARN. *Prodr.* i. 39.—THW. *Enum. Pl. Zeyl.* 23.—WIGHT, *Ill.* t. 23.—MIQ. *Fl. Ind. Bat.* i. p. ii. 128; in *Ann. Mus. Lugd.-Bat.* i. 271, 317.—HOOK. F. *Fl. Brit. Ind.* i. 208.—WALP. *Rep.* iv. 248; *Ann.* vii. 254.

<sup>3</sup> LOEFL. *It.* 195.—L. *Gen.* n. 161.—ADANS. *Fam. des Pl.* ii. 268.—J. *Gen.* 425; in *Mém. Mus.* i. 390. LAMK. *Dict.* iii. 370; Suppl. iii. 226.—DC. *Prodr.* i. 341.—SPACH, *Suit. à Buffon*, iii. 150.—ENDL. *Gen.* n. 5656.—A. GRAY, *Gen. Ill.* t. 185, 186.—B. H. *Gen.* 140, n. 15.—SCHNIZL. *Iconogr.* t. 233.—O. BERG, in *Bot. Zeit.* (1856), 745.—H. BN. in *Adansonia*, xi. 14, t. 3.

length. The stamens are also inserted at the back. There are sometimes five, one middle and two lateral, or three only, the middle one being a little shorter than the others (fig. 118-121), or

*Krameria cistoides.*



Fig. 114. Long. sect. of flower.



Fig. 115. Flower without calyx.



Fig. 113. Flower (3/4).

four, of which the two anterior are longer than the two posterior in the adult flower (fig. 113-115, 122, 123). The petals, like the pieces of the androecium, are free or united among themselves by a

*Krameria triandra.*



Fig. 116. Fruit (3/4).



Fig. 117. Long. sect. of fruit.

common basilar part united also to the base of the corolla. Each stamen is composed of a filament and a basifixed anther, with two lateral cells dehiscing at the apex by a sort of wide pore or funnel more or less cut upon the edges, at the bottom of which open the two cells. The gynæceum is free and superior, formed of an ovary formed at first of two cells, one anterior the other posterior; but this latter is early arrested in its development.<sup>1</sup> In front of the

<sup>1</sup> See H. Bx. in *Adansonia*, xi. 18.

ovary to the right and left is seen a large hypogynous gland, thick, fleshy, striped or reticulate on the outer surface; these two organs

*Krameria triandra.*



Fig. 118. Flower.



Fig. 119. Diagram.



Fig. 120. Long sect. of flower.

have generally been considered as two modified anterior petals.<sup>1</sup> The ovary is surmounted by a style in the form of an elongated hollow cone stigmatiferous at its scarcely swollen apex; in the

*Krameria Lima.*

*Krameria triandra.*

*Krameria secundiflora.*



Fig. 123. Diagram.



Fig. 121. Flower without calyx.



Fig. 122. Diagram.

single cell is a vertical posterior placenta, more or less prominent, bearing in its upper part two descendent collateral anatropous ovules, with micropyle looking upwards and outwards.<sup>2</sup> The fruit

<sup>1</sup> But they grow after the gynæceum.

<sup>2</sup> They have two coats. Their short funicle is often slightly twisted, so that the micropyle

is carried quite to the side or even becomes a little posterior, the point of insertion not varying.

is dry, nearly globular, indehiscent, bristling outwardly with stiff prickles, armed at the summit with reflexed points, which gives them the appearance of little harpoons. The single seed contains under its coats a large fleshy embryo whose plano-convex cotyledons are prolonged at the base round the superior radicle, which they incompletely surround as with a case. *Krameria* consists of suffrutescent plants from the tropical regions of the two Americas. The broad thick-set woody root, often rich in colouring matter, is surmounted by a small much ramified stem, and the branches bear alternate leaves covered with a whitish down. They are exstipulate and generally simple and entire. In a Mexican species, *K. cytissoides*,<sup>1</sup> they are however partly compound with three folioles articulate at the base. The flowers are solitary, generally supported by a peduncle more or less long, bearing at a variable height, sometimes close to the calyx, two sterile lateral bractlets. Some twenty-five species<sup>2</sup> belonging to this genus have been described; but it seems to us the number ought to be reduced one-half.

The *Polygalaceæ* family is very natural except one or two genera. It was established in 1815 by A. L. DE JUSSIEU.<sup>3</sup> Until then the *Polygalææ* had been placed by him among the *Pediculariææ*,<sup>4</sup> while ADANSON, recognising much better their true affinities, had joined them to the family *Tithymalææ*.<sup>5</sup> JUSSIEU knew six of the genera which we have preserved as distinct, and he joined to them *Tetralthea*. DE CANDOLLE<sup>6</sup> in 1824 admitted the family such as DE JUSSIEU had made it, adding to it *Securidaca*, with *Soulamea* which belongs to *Rutacææ-Quassiæ*.<sup>7</sup> From 1828 to 1830, A. S.-HILAIRE and MOQUIN, in their *Mémoires sur la Famille des Polygalææ*,<sup>8</sup> added to the preceding types the *Mundtia* of KUNTH,<sup>9</sup> studying in

<sup>1</sup> CAV.  *Ic. Rav.* iv. 60, t. 390.—DC.  *Prodr.* n. 7.—H. BN. in  *Adansonia*, xi. 16.

<sup>2</sup> R. et PAV.  *Prodr.* t. 3;  *Fl. Per.* i. t. 93, 94.  
—HOOK. et ARN.  *Beech. Voy. Bot.* 8, t. 5.—A. S. H.  *Fl. Bras. Mer.* ii. 72, t. 97.—GRISEB.  *Fl. Brit. W. Ind.* 30.—CHAPM.  *Fl. S. Unit. St.* 86.  
—TORR. in  *Emor. Rep. Bot.* t. 13.—C. GAY,  *Fl. Chil.* i. 342.—TR. et PL. in  *Ann. Sc. Nat. sér.* 4, xvii. 144.—WALP.  *Rep.* i. 247; v. 67;  *Ann.*

i. 76; iv. 240; vii. 255.

<sup>3</sup> In  *Mém. Mus.* i. 385 ( *Polygalææ*).

<sup>4</sup>  *Gen.* (1789), 99.

<sup>5</sup>  *Fam. des Pl.* ii. (1763), 358.

<sup>6</sup>  *Prodr.* i. 321, Ord. 18.

<sup>7</sup>  *Voy. vol.* iv. 413, 501.

<sup>8</sup> In  *Mém. Mus.* xvii. 315; xix. 305.

<sup>9</sup>  *Nov. Gen. et Spec.* i. (1816).

detail the characters of the various genera. Since then the limits of this family have scarcely been altered; and in 1862 BENTHAM and HOOKER in their *Genera* only added the old genus *Moutabea* of AUBLET,<sup>1</sup> formerly connected with the *Ebenaceæ*; *Xanthophyllum* of Roxburgh,<sup>2</sup> whose mode of placentation had hitherto separated it from this group; *Carpolobia* of DON,<sup>3</sup> long imperfectly known; and the genus *Phlebotenia*, then recently established by GRISEBACH.<sup>4</sup> By reducing to simple sections several genera preserved by these authors, we find only twelve remaining grouped into three series of which the following are the distinctive characters.

1. POLYGALÆÆ.—Flowers irregular. Ovary with two cells or with only one, the posterior aborting (rarely with three cells). One descendent ovule inserted in the inner angle of each cell. Fruit dry or fleshy. Embryo albuminous or exalbuminous.—9 genera.

2. XANTHOPHYLLÆÆ.—Flowers irregular (of *Polygala*). Ovary unilocular, with parietal placentas. Ovules 2-∞. Fruit fleshy. Embryo albuminous or exalbuminous.—1 genus.<sup>5</sup>

3. KRAMERIÆÆ.—Flowers irregular, resupinate. Petals 3, 4, posterior. Stamens 3-5 posterior. Ovary unilocular (by abortion), furnished with two large anterior-lateral glands. Single cell (anterior) with two descendent collateral ovules. Fruit dry, indehiscent, and monospermous. Embryo exalbuminous.—1 genus.

Some five hundred species of *Polygalaceæ* are reckoned. All those of the *Krameria* series are American; and all of the genus *Xanthophyllum* belong to tropical Asia and Oceania. In the *Polygaleæ* series, which alone contains about five hundred species, three-fifths are American; *Phlebotenia* and *Monnina* are exclusively so, while *Muraltia* and *Mundtia*, containing some fifty species, belong to South Africa; the two known *Carpolobias* are from tropical western Africa; *Trigoniastrum* from Malaysia. The *Comesperma* proper are all Australian, and the species of the section *Bredemeyera* are from tropical America. *Polygala* and *Securidaca* are common to both worlds, the latter to the warm regions only.<sup>6</sup>

<sup>1</sup> *Glean.* (1775).

<sup>2</sup> *Pl. Coromand.* iii. (1819).

<sup>3</sup> *Gen. Syst.* i. (1831).

<sup>4</sup> In *Pl. Wright. Cub.* (1861).

<sup>5</sup> Or two, if *Moutabea* is connected with this

series, whose characters should then be slightly modified, the placentation of *Moutabea* being really axile.

<sup>6</sup> It would be useful to study histologically the stems of the *Polygalaceæ*, especially those

The *Polygalaceæ* have been considered so analogous to the *Tremandraceæ* by some authors that they have treated the former as only an irregular form of the latter. This is true especially as regards the gynæceum, which has in both groups almost always the same number of cells, with an ovule whose various parts have the same direction; but the perianth is very different in the *Tremandraceæ*, and more analogous to that of certain *Mylæ* (*Lasiopetaleæ*) with which they have also been connected. It appears to us that the *Tremandraceæ* and *Polygalaceæ* should be ranged side by side. The latter show an affinity with the *Geraniaceæ* and *Linaceæ*, from which they are distinguished particularly by the anterior keel of their flower and by the organization of the androecium. They have also, like the *Linaceæ*, the ovules and seeds of the *Euphorbiaceæ*, and in certain cases the same gynæceum. We shall obtain a good idea of these relationships by comparing the *Polygalaceæ*, plants with milky juice, with the irregular flowers of *Pedilanthus* on the one hand, and on the other with irregular types of *Chailloteæ*, such as *Tupura*, whose resemblance to *Moutabea* is considerable. It has also been said, and with reason, that there is a great analogy between the *Polygalaceæ* and the *Sapindaceæ*; the latter, however, are easily distinguished by the situation of their disk, exterior to the androecium, the symmetrical form of the latter differing from that of the *Polygalaceæ*, and by the direction of the different parts of the ovules when they are indefinite in number. The *Violaceæ* could only be confounded with the *Xanthophylleæ* among the *Polygalaceæ*, they alone having parietal placentas; but the *Violaceæ* have an isostemonous androecium, dissimilar stamens when the flower is as irregular as in the *Xanthophylleæ*, and, in a fruit which is often capsular, arillate seeds. Finally the *Kramerieæ* by their resupinate flowers have some analogy to the *Leguminosæ* with which they have often been connected; but the relationship is more in appearance than reality, and we have seen that the *Krameries* have a di-carpellary gynæceum which renders all assimilation between the two groups impossible.

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of the climbing species from warm regions. But few researches have been made in this way. GRUEGER (in *Bot. Zeit.* [1850], 161), has indicated the peculiarities of the structure of *Scen-*

*ridaca volubilis* and of a *Comesperma* (*Catacoma lucida*). See DCNE, in *Arch. Mus.* (1839), i. 205, t. 10.—OLIV. *Stem. Dicot.* 6. Several *Polygalaceæ* are cited as not having medullary rays.

The *Polygalaceæ* have tolerably diverse properties;<sup>1</sup> some are milky, others bitter. Several are rich in tannin. A great number are supposed to have a special acrid principle called *polygaline* or *sénégine*, of which we shall speak later. The indigenous species of *Polygala* were formerly much used in country medicines, but very little at the present day. Their name Milkworts (Fr. *Laitiers*) comes doubtless from the whitish colour of their juice; and it is probably the presence of this juice which has led the vulgar to believe that the *Polygalas* promote the secretion of milk in women and cattle. *P. vulgaris*<sup>2</sup> is considered a tonic stomachic, sudorific, and slightly emetic; it has a slightly aromatic acrid taste, scarcely bitter, with a faint not disagreeable odour. It is said to be used in adulterating green tea, and has been recommended in affections of the lungs and kidneys, *P. amara*<sup>3</sup> has the same properties but stronger. It is especially good in cases of chronic bronchitis, catarrh, and hæmoptysis; it is very bitter. *P. vulgaris* is often substituted for it in commerce. In the Palatinate *P. calcarea*<sup>4</sup> is especially used. In the United States *P. rubella*<sup>5</sup> serves the same purpose; it is decidedly bitter. In small doses an infusion of it is tonic, digestive and stimulant; in large doses it is diaphoretic. The most active of the medicinal species appears to be *P. Senega*<sup>6</sup> or *P.* of Virginia, a perennial species with large twisted roots, greyish, rough, and hard, terminated above by a deformed tuber covered with little buds longitudinally traversed by a prominent rib. Its taste is at first faint, then acrid, sharp, irritant, and nauseous, provoking

<sup>1</sup> ENDL. *Enchirid.* 569.—LINDL. *Fl. Med.* 125; *Veg. Kingd.* 377.—GUIB. *Drog. Simpl.* éd. 6, iii. 655.—ROSENTH. *Syn. Pl. Diaphor.* 785.

<sup>2</sup> L. *Spec.* 986.—DC. *Prodr.* i. 324, n. 43.—GUIB. *op. cit.* 658.—GREN. et GODR. *Fl. de Fr.* i. 195.—REV. in *Bot. Méd. du XIX Siècle*, iii. 103, t. 9.—CAZ. *Tr. des Pl. Méd. Ind.* éd. 3, 864.—*P. pubescens* ROHD.—? *P. comosa* SCHUHR.—? *P. mouspeliaca* ALL.—*P. serpyllacea* WEIHE.—*P. oxyptera* REICH. (*Herbe à lait, Laitier commun, Fleur ambrevale.*)

<sup>3</sup> L. *Spec.* 987.—WAHL. *Carp.* n. 701.—DC. *Prodr.* n. 44.—GREN. et GODR. *loc. cit.* 196.—GUIB. *op. cit.* 658.—*P. austriaca* CRANTZ, *Fl. Austr.* t. 2, fig. 4.—*P. decipiens* BESS. *Cont.* ii. 73.—*P. Vaillantii* BESS.—*P. amarella* CRANTZ.—*P. myrtifolia* FR. (*Laitier amer.*)

<sup>4</sup> SCH. *Exs. cent.* ii. n. 15.—GODR. *Fl. Lorr.*

95.—GREN. et GODR. *loc. cit.* 196.—*P. amara* REICH. (nec L.).—*P. amarella* COSS. et GERM. *Fl. Par.* 56 (nec CRANTZ).

<sup>5</sup> PURSH. *Fl. Bor. Amer.* ii. 464.—W. *Spec.* iii. 875.—DC. *Prodr.* n. 108.—BIGEL. *Med. Bot.* iii. t. 54.—LINDL. *Fl. Med.* 126.—*P. polygama* WALT. *Fl. Carol.* 179.—DC. *Prodr.* n. 110.

<sup>6</sup> L. *Spec.* 990.—WOODV. *Med. Bot.* iii. t. 93.—DC. *Prodr.* n. 109.—BIGEL. *Med. Bot.* ii. t. 30.—MÉR. et DEL. *Dict. Mat. Méd.* v. 424.—NEES et EBERM. *Pl. Med.* t. 412.—LINDL. *Fl. Med.* 125.—*Bot. Mag.* t. 1051.—GUIB. *loc. cit.* 656, fig. 748.—ENDL. *Enchirid.* 569.—A. RICH. *Elém.* éd. 4, ii. 532.—PEREIRA, *Elem. Mat. Med.* ed. 4, ii. p. ii. 565.—MOQ. *Bot. Méd.* 65, fig. 18.—REV. in *Fl. Méd. du XIX Siècle*, iii. 319, t. 34.

salivation and coughing. In its native country it is employed fresh as a remedy for the bites of venomous serpents, being prized beyond measure on this account and known under the name of *Snake-root*. Dry, it is less active, but in large doses causes vomiting and alvine evacuations. It is also an active medicament in pulmonary affections, chronic bronchitis, catarrh, pleurisy with effusion, croup, acute rheumatism in the joints and ophthalmia; it is diuretic, diaphoretic, an emmenagogue, and a hydragogue. American practitioners have prescribed it for all maladies, "even to extravagance." According to the old analysis of GEHLEN, its active pungent principle, the so-called *sénépine* or *polygaline*, when purified, is found to be the *polygalic*<sup>1</sup> acid, causing a cough and sneezing, and frothing in water like saponine. There are in America a great many species possessing qualities similar to those of *P.* of Virginia: *P. caracasana*,<sup>2</sup> *formosa*,<sup>3</sup> and *monticola*<sup>4</sup> in Cumana, and in the United States *P. purpurea*,<sup>5</sup> *sanguinea*<sup>6</sup> and *paucifolia*;<sup>7</sup> in Mexico *P. glandulosa*<sup>8</sup> and *scoporia*,<sup>9</sup> in the Antilles *P. paniculata*,<sup>10</sup> in Brazil *P. poaya*,<sup>11</sup> in Australia *P. veronica*,<sup>12</sup> in India *P. arvenis*<sup>13</sup> and *crotalariaioides*,<sup>14</sup> at the Cape *P. serpentaria*.<sup>15</sup> All are evacuant, more or less vomitive, used as deobstruent in chronic bronchial catarrh, and have most of them, rightly or wrongly, the reputation of being alexipharmic. In Chili an infusion of *P. thesioides*<sup>16</sup> is administered in the treatment of dropsy and pleurisy. *P. (?) theezans*<sup>17</sup> is so named because the Japanese and Javanese use it as tea. The

<sup>1</sup> QUEV. in *Journ. Pharm.* xxii. 460.

<sup>2</sup> H. B. K. *Nov. Gen. et Spec.* v. 407.—DC. *Prodr.* n. 120.—LINDL. *Fl. Med.* 125.

<sup>3</sup> H. B. K. *loc. cit.*—ROSENTH. *op. cit.* 787.

<sup>4</sup> H. B. K. *loc. cit.* 405.—DC. *Prodr.* n. 111.

<sup>5</sup> NUTT. ex ROSENTH. *op. cit.* 787.—*P. sanguinea* MICHX. (nec L.).

<sup>6</sup> L. *Spec.* 991.—LINDL. *Fl. Med.* 126.

<sup>7</sup> W. *Spec.* iii. 880.—*Purpurea* AIT. *Hort. Kew.* ed. 2, iv. 244 (nec NUTT.).—*Trichispermum grandiflora* RAFIN. *Specch.* i. 117.

<sup>8</sup> H. B. K. *loc. cit.* 404, t. 50.—*Viola punctata* W. (ex Ram. et Sch. *Syst.* v. 391).

<sup>9</sup> H. B. K. *loc. cit.* 399.—DC. *Prodr.* n. 101.

<sup>10</sup> L. *Amaz.* v. 402.—SW. *Obs.* 272, t. 6, fig. 2.—DC. *Prodr.* n. 100.

<sup>11</sup> MART. *Mat. Med. Bras.* t. 2, 8, fig. 6—A. S.

H. *Pl. Us. Bras.* n. 71; *Fl. Bras. Mer.* ii. 2. Very active and, according to MARTIUS, as good as Ipecacuanha.

<sup>12</sup> F. MUELL. *Pl. Vict.* i. 184. (Syn. According to BENTH. *Fl. Austral.* i. 139, de *P. japonica* HOUTT. *Syst.* 3, t. 62, fig. 1.—DC. *Prodr.* n. 34.—*P. vulgaris* THUNB. *Fl. Jap.* 277.

<sup>13</sup> W. *Spec.* iii. 876.

<sup>14</sup> BUCHAN. ex DC. *Prodr.* n. 65.—LINDL. *Fl. Med.* 126.

<sup>15</sup> ECKL. et ZEYH. *Enum.* n. 181.—HARV. et SOND. *Fl. Cap.* i. 93 (*Kaffir Schlagen Wortel*).

<sup>16</sup> W. *Spec.* iii. 877.—C. GAY, *Fl. Chil.* i. 239.—*Clinelin* FICILL. *Obs.* ii. t. 13 (*Quelen-quelen*).

<sup>17</sup> L. *Mantiss.* 260.—DC. *Prodr.* n. 163 (*Lep-tospermum ?*).—ROSENTH. *op. cit.* 788.—*P. Thea* BURM. *Fl. Ind.* 153.



Arabs use the seeds of *P. tinctoria*<sup>1</sup> for tape worm; the root furnishes a kind of indigo. *P. venenosa*<sup>2</sup> is dreaded by the Javanese. COMMERSON says his guides were not willing for him to touch this plant; and having done so he was seized with a fit of sneezing and suffered from headache. *P. diversifolia*,<sup>3</sup> a woody species from the Antilles, is said to have the odour and properties of guaiacum, and is used in the treatment of the same disorders. Several *Monninas* have similar qualities. In Peru the root of *M. pterocarpa*<sup>4</sup> is employed in cases of dysentery. A cold infusion of the bark of *M. salicifolia*<sup>5</sup> is used to bathe the head and make the hair grow. *M. polystachya*<sup>6</sup> is especially celebrated as an astringent. The women used it like the former to give strength and brilliancy to the hair; and it is said to be a remedy for dysentery. It is also employed in polishing metals, principally silver plate. By their richness in tannin these plants resemble *Ratanhia*,<sup>7</sup> or Rhatany root, which ranks among the best astringent medicines. It is procured from the thick woody knotted roots, red or brown in colour, of several species of *Krameria*. In this genus,<sup>8</sup> the species of which have been unmeasurably multiplied, we have proved that there are but two which furnish the *Ratanhia* of European commerce. These are: *K. Ixima*<sup>9</sup> (fig. 123), whose varieties constitute the R. of New Granada or Savanilla and the Andes; and *K. triandra*<sup>10</sup> (fig. 116-121), yielding the R. of Peru. The R. of Texas, produced from *K. secundiflora*,<sup>11</sup> is not used in France, and but very little in Germany.

<sup>1</sup> VAHL, *Symb. Bot.* i. 50.—*P. bracteosa* FORSK.

<sup>2</sup> J. in *Poir. Dict.* v. 493.—LINDL. *Fl. Med.* 126 (*Katu-tutun*).

<sup>3</sup> L. *Aman.* ii. 140.—*Badiera diversifolia* DC. *Prodr.* i. 334, n. 1.

<sup>4</sup> R. et PAV. *Fl. Per.* i. 174.

<sup>5</sup> R. et PAV. *op. cit.* i. 172.

<sup>6</sup> RUIZ, in *Lamb. Cinchon.* 144, t. 3.—DC. *Prodr.* i. 33.—LINDL. *Fl. Med.* 127.—ROSENTH. *op. cit.* 789 (*Fallhoy Masca*).

<sup>7</sup> GUIB. *Drog. Simpl.* éd. 6, iii. 658.—ROSENTH. *op. cit.* 789.—PEREIRA, *Elem. Mat. Med.* ed. 4, ii. p. ii. 568.—BENDER, *Treatise on Ratanhia*, Stuttg. (1818).—COTTON, *Study of the genus Krameria and the roots which it gives to medicine* (thès. Par. 1868).

<sup>8</sup> H. BN. in *Adansonia*, x. 22.

<sup>9</sup> LOEFL. *It.* 71.—L. *Spec.* 177.—TUSS. *Fl. Ant.* i. 113, t. 15.—DC. *Prodr.* i. 341, n. 1.—

HAYNE, *Arzn.* 8, t. 13.—A. RICH. *Elém.* éd. 4, ii. 537.—MOQ. *Bot. Méd.* 68.—BERG, in *Bot. Zeit.* (1856), 763.—TR. et PL. in *Ann. Sc. Nat. sér.* 3, xvii. 144.—H. BN. *loc. cit.* 20.—*K. tomentosa* A. S. H. *Fl. Bras. Mer.* ii. 74.—*K. grandifolia* BERG, *loc. cit.* 764. Les *K. arida* BERG (*loc. cit.*), *argentea* MART. et *cuspidata* PRESL are probably also forms of it.

<sup>10</sup> R. et PAV. *Fl. Per.* i. t. 93.—DC. *Prodr.* n. 4.—REM. et SCH. *Syst.* iii. 458.—HAYNE, *Arzn.* viii. 14.—NEES et EBERM. *Pl. Med.* t. 413.—GUIB. *loc. cit.* 659, t. 749.—LINDL. *Fl. Med.* 128.—STEV. et CHURCH. *Med. Bot.* ii. t. 72.—ROSENTH. *op. cit.* 789.—BERG, *loc. cit.* 766.—BERG et SCHM. *Darst.* iii. f. (nec H. B. K.).

<sup>11</sup> MOC. et SESS. ex DC. *Prodr.* i. 341.—COTT. *loc. cit.* 43.—K. *Beyrichii* SPORDL.—*K. lanceolata* TORR. in *Mem. Amer. Lyc. N. York*, ii. 168.—A. GRAY, *Pl. Thurb.* 301.

The *Ratanhins* contain tannin in abundance, a red extractive principle and a kind of sugar supposed to be produced by some chemical change in the tannin, amylaceous and gummy matter, salts and an acid.<sup>1</sup> The tannic principle is varied in character, according to the sorts and varieties; it gives to these roots their active properties as tonics, astringents, hemostatics, antiblemmorrhagics, antidiarrhetics, antiputrids, and odontalgics. The wood and bark of the root are used, as is also a dry extract very similar to kino. The plants are also applied to industrial purposes. An infusion of seve *Kramerias*, of a blood-red, has been employed in adulterating port wine, and it may be used also in preparing skins. In tropical Asia several species of *Xanthophyllum* are valued for the qualities of their wood, especially *X. Arnottianum*<sup>2</sup> from India, and *X. vitellinum*<sup>3</sup> from Java. Some *Polygalas* are cultivated as ornamental. These are generally Cape species, often with opposite leaves, and large violet flowers (fig. 104–106), which usually open towards the end of the winter in our green-houses and hot-houses.

<sup>1</sup> *Ratanhine* ( $C^{20}H^{12}AzO^6$ ), contained in several American extracts is said not to exist in the root (CORROX). The existence of krameric acid is actually considered doubtful (GERHARDT).

<sup>2</sup> WIGHT, *Ill.* i. 50.—ROSENTH, *op. cit.* 790.—*X. flarescens* WIGHT et ARN. (nec ROXB.).

<sup>3</sup> WALP. *Rep.* i. 248.—ROSENTH, *op. cit.* 1153, *Jackia vitellina* BL. *Bijdr.* 61.

## GENERA.

### I. POLYGALEÆ.

1. **Polygala** T. — Flowers irregular hermaphrodite; receptacle convex. Sepals 5, usually petaloid, more or less unequal; the 2 lateral slightly (*Salomonina*, *Badiera*), or much larger than the others, wing-shaped; in præfloration very much imbricate, deciduous or persisting round the fruit. Petals 5, in more or less gamopetalous corolla, open at back, connate among themselves and with the stamens, imbricate; the anterior (keel) usually much larger, concave-galeate or cymbiform, 2, 3-lobed at apex, sometimes dorsally or at apex cristate, more or less lobed or fimbriate, accrescent, in præfloration interior; the 2 posterior minute, tongue-shaped or squamiform, often 2-lobate, sometimes connate with lateral, smaller or subnil (often 0). Stamens usually 8, more rarely 6, or 5, 4 (*Salomonina Epirhizanthos*), 2-seriate (4 alternipetalous); filaments 1-adelphous at base, connate in sheath, open at back, afterwards in lateral series equal 2-adelphous, phalanges finally at apex free; anthers incompletely or completely 2-locular, at base and apex sometimes ciliate or piliferous, dehiscing inwardly at apex by a short cleft or opening of varied form, simple or more or less 2-plicate. Germen free, surrounded at base by disk, thin or subnil, sometimes more or less stipitate, 2-locular; cells one anterior; one posterior; style at apex variously curved, unequally dilated or geniculate; lobes stigmatiferous 2-4, heteromorphous or geniculate; stigmatiferous lobes 2-4 heteromorphous and unequal; 1, 2, posterior, larger; ovule in each cell solitary descendent; micropyle extrorse superior. Capsule generally surrounded by calyx, sometimes naked, the perianth being caducous (*Semioecardium*), ancipitous-compressed suborbiculate, ovate, obovate, emarginate or equally or unequally (*Badiera*) 2-dymous; at margin sometimes marginate or shortly winged, loculicidal, 1, 2-spermous. Seed descendent, glabrous or pilose; exostome usually incrassate in variously shaped aril; albumen copious or membranous or more rarely 0 (*Chamaebuxus*); embryo more or less thick; cotyledons foliaceous flat or plano-convex.

—Shrubs, undershrubs or herbs, rarely parasitical discoloured, bearing scales (*Epirhizanthus*); leaves alternate, opposite or verticillate, simple, usually entire, exstipulate; flowers in simple or more rarely compound racemes or spikes, sometimes short capituliform; inflorescence terminal, lateral, or more rarely axillary; pedicels often articulate at base, 1-bracteate; bractlets usually 2. (*All hot and temperate regions.*) See p. 71.

2. **Phlebotænia** GRISEB.<sup>1</sup>—Flowers nearly of *Polygala*; sepals the 2 lateral larger wing-shaped. Petals 5; 2 exterior free or slightly adnate to staminal tube, separated from carina; carina longer than the posterior, connate with it, concave-galeate and cristate. Stamens 8; sheath open at back, high adnate to petals. Gynæceum of *Polygala*. Capsule 2-locular, at margin on both sides 2-winged; wings 4, vertical membranous; 2 anterior much larger. Other characters of *Polygala*.—Glabrous shrubs; leaves alternate, at base cuneate, rigid, oblique, subparallel reticulate-venose; flowers in short terminal or lateral racemes.<sup>2</sup> (*Cuba.*<sup>3</sup>)

3. **Muraltia** NECK.<sup>4</sup>—Flowers nearly of *Polygala*; sepals in pairs unequal glumaceous. Stamens 7, 8, in sheath, connate above fissure. Germen and other characters of *Polygala*. Capsule submembranous compressed. Apex 4-gibbous or 4-cornate, sometimes truncate, loculicidal at margin. Seeds albuminous thick arillate.—Ramified shrubs or undershrubs; leaves alternate or fasciculate, small, rigid, often aciculate; flowers axillary, solitary, subsessile. (*South Africa.*<sup>5</sup>)

4. **Mundtia** K.<sup>6</sup>—Flowers nearly of *Polygala*; sepals 2 large

<sup>1</sup> *Pl. Wright, Cub.* 156; *Cat. Pl. Cub.* 14.—*B. H. Gen.* 138, n. 8.

<sup>2</sup> A genus much better made a section of *Polygala* (?), nearly related to *Badiera*, differs especially by its lateral petals, exterior sub-equally long sepals, long and narrow at base, with winged fruit; wings four, in pairs, very unequal.

<sup>3</sup> *Spec. 1. P. cuneata* GRISEB. *loc. cit.*—*WALP. Ann.* vii. 253.

<sup>4</sup> *Elem.* n. 1832.—*DC. Prodr.* i. 335.—*A. S. H. et Moq. in Mém. Mus.* xvii. 352, t. 29, fig. 4; xix. 331.—*SPACH, Suit. à Buffon*, vii. 141.—*ENDL. Gen.* n. 5650.—*H. Bn. in Adansonia*, i. 178.—*B. II. Gen.*

137, n. 4.—*Heisteria* BERG. *Fl. Cap.* 185 (nec L.).

<sup>5</sup> *Spec. ad 50, ANDR. Bot. Repos.* t. 363, 424 (*Polygala*).—*PAXT. Mag. Bot.* iv. 149, ic.—*HARV. et SOND. Fl. Cap.* i. 95.—*Miq. in Ann. Mus. Lugd.-Bat.* i. 182.—*WALP. Ann.* vii. 249.

<sup>6</sup> *Nor. Gen. et Spec.* v. 392, not. (*Mundtia*).—*DC. Prodr.* i. 337.—*A. S. H. et Moq. in Mém. Mus.* xvii. 352; xix. 332 (part).—*SPACH, Suit. à Buffon*, vii. 145.—*ENDL. Gen.* n. 5651.—*B. II. Gen.* 137, 974, n. 5.—*H. Bn. in Payer Fam. Nat.* 310.—*Nylandtia* DUMORT. *Comm.* 31.

petaloid, wing shaped. Keel concave-galeate or cristate. Carina concave-galeate or cristate. Fruit drupaceous, 1, 2-spermous; seeds exarillate. Other characters of *Polygala*.—Ramified small shrubs, usually spinescent; leaves fasciculate subacicular; flowers terminal or more usually axillary, solitary or sometimes 2, 3-nate. (*South Africa*.<sup>1</sup>)

5. **Monnina** R. and PAV.<sup>2</sup>—Flowers nearly of *Polygala*; sepals lateral, large, petaloid, wing-shaped. Petals 3-5; the lateral very small, scarcely visible, glanduliform or oftener 0; the anterior (keel) concave-galeate, entire or widely 3-lobed; the posterior small, more or less adnate to staminal tube. Stamens 8 (of *Polygala*) or 6 (the 2 lateral oppositipetalous wanting); anthers 1, 2-locular, dehiscing by two short oblique clefts. Germen 2-locular, or sometimes (posterior cell aborting) 1-locular. Other characters of *Polygala*. Fruit 1, 2-spermous, dry, indehiscent, wingless, or at margin membranous-winged, more rarely drupaceous; seed exarillate, slightly albuminous—Herbs, shrubs or small trees; leaves alternate; flowers in spike-shaped racemes, terminal or more rarely axillary, 2-bracteolate. (*Trop. and sub. trop. America*.<sup>3</sup>)

6. **Comesperma** LABILL.<sup>4</sup>—Flowers nearly of *Polygala*; sepals 2 larger, wing-shaped. Petals, the lateral more or less connate with keel (*Eucomesperma*) or free (*Bredemeyera*<sup>5</sup>). Stamens generally 8, 1-adelphous; sheath cut at back. Germen and ovules of *Polygala*. Capsule plano-compressed, subfleshy or membranous or coriaceous at base, long cuneate-narrow, loculicidal at margin; seeds glabrous or pubescent above, aril oftener small or linear to raphe; testa pilose with very long descending hairs, on all sides or oftener close to hilum,

<sup>1</sup> Spec. 1, 2, HARV. et SOND. *Fl. Cap.* i. 95.

<sup>2</sup> R. et PAV. *Fl. Per. Syst.* i. 169.—DC. *Prodr.* i. 338.—A. S. H. et Moq. in *Mém. Mus.* xvii. 352, t. 30, fig. 2; xix. 333.—SEACH, *Suit. à Buffon*, vii. 147.—ENDL. *Gen.* n. 5652.—H. BN. in *Adansonia*, i. 175; in *Payer Fam. Nat.* 310.—B. H. *Gen.* 139, n. 12.—*Hebe-andra BONPL.* in *Berl. Mag.* (1802) 40.

<sup>3</sup> Spec. about 50; H. B. K. *Nov. Gen. et Spec.* v. 409, t. 501-505.—A. S. H. *Fl. Bras. Mer.* ii. 59, t. 93-95.—C. GAY. *Fl. Chil.* i. 239.—HOOK. et ARN. in *Beech. Voy. Bot.* t. 6.—TR. et PL. in *Ann. Sc. Nat.* sér. 4, xvii. 136.—Miq. in *Ann. Mus. Lugd.-Bat.* i. 191.—*Bot. Mag.* t. 3122.—WALP. *Rep.* i. 245; ii. 769; *Ann.* i. 75; ii. 85;

iv. 239; vii. 254.

<sup>4</sup> *Pl. Nov.-Holl.* ii. 21, t. 159-163.—DC. *Prodr.* i. 334.—A. S. H. et Moq. in *Mém. Mus.* xvii. 351, t. 29, fig. 2; xix. 329.—ENDL. *Gen.* n. 5649.—H. BN. in *Payer Fam. Nat.* 310.—B. H. *Gen.* 138, 974, n. 6.—Miq. in *Ann. Mus. Lugd.-Bat.* i. 184.

<sup>5</sup> W. in *Neue Schr. Ges. Nat. Berl.* iii. 406, t. 4.—DC. *Prodr.* i. 340.—A. S. H. et Moq. *op. cit.* xix. 337.—ENDL. *Gen.* n. 5654.—B. H. *Gen.* 138, 974, n. 7.—*Catoecma* BENTH. in *Hook. Journ. Bot.* iv. 401.—ENDL. *Gen.* n. 5648; (*Suppl.* iii. 96).—*Hualania* PHIL. in *Linnaa.* xxxiii. 18 (ex B. H. *loc. cit.*).

comose. Suberect or scandent shrubs (*Bredemeyera*), or oftener suffrutescent herbs erect or voluble (*Eucomesperma*); leaves alternate, usually small (*Eucomesperma*) or ovate, oblong, wide, subcoriaceous penninerved (*Bredemeyera*); flowers in simple or ramified racemes. (*Trop. America*. [*Bredemeyera*<sup>1</sup>], *Australia*.<sup>2</sup>)

7. *Securidaca* L.<sup>3</sup>—Flowers nearly of *Polygala*; sepals 2, very large, wingshaped subpetaloid. Petals of *Polygala*; the lateral often joined to the keel. Stamens 8 (of *Polygala*). Germen 2-locular; one cell often very small, empty; the other 1-ovulate. Fruit indehiscent, coriaceous or ligneous, often eristate at base, at apex produced in a wing, elongated rarely short (*Corytholobium*<sup>4</sup>), sometimes much dilated above (*Lophostylis*<sup>5</sup>) often narrow at base (samaroid); seed 1, exarillate, exalbuminous; cotyledons of straight embryo, thick-fleshy; radicle very short, retracted between them.—Shrubs often scandent; leaves alternate, usually entire, 2-glandular; flowers in terminal and axillary racemes, simple or compound, sometimes short, rarely fasciculate-2-chotomous (*Corytholobium*). (*All warm regions (except Australia*.<sup>6</sup>)

8. *Carpolobia* G. Don.<sup>7</sup>—Flowers nearly of *Polygala*; lateral sepals larger. Petals 5, connate in a corolla cut at back; the anterior carinate, concave-galcate, entire or shortly eristate at apex. Stamens 5, connate at base in a sheath cut at back, and outwardly adnate to corolla; antherless filaments sometimes 1-3; anthers dehiscing obliquely inwards. Germen thickly stipitate, 3-locular. Other characters of *Polygala*. Fruit fleshy, subglobose; seeds 1-3, exaril-

<sup>1</sup> Spec. about 10, A. S. H. *Fl. Bras. Mer.* ii. t. 90, 91.—Poepp. et Endl. *Nor. Gen. et. Spec.* iii. t. 273 (*Catacoma*).—Tr. et Pl. in *Ann. Sc. Nat.* sér. 4, xvii. 133 (*Catacoma*).—Hassk. in *Ann. Mus. Lugd.-Bat.* i. 187.—Walp. *Rep.* i. 213; v. 614.

<sup>2</sup> Spec. about 20; Deless.  *Ic. Sel.* iii. t. 20.—F. Muell. *Fl. Vict.* t. 8.—Benth. *Fl. Austral.* i. 141.—Walp. *Ann.* ii. 82; vii. 251.

<sup>3</sup> *Gen.* n. 852.—J. *Gen.* 366.—Poir. *Dict.* viii. 50; Suppl. v. 124.—Lamk. *Ill.* t. 599.—DC. *Prodr.* i. 310.—A. S. H. et Moq. in *Mém. Mus.* xvii. 354, t. 31; xix. 335.—Spach, *Suit. à Buffon*, vii. 148.—Endl. *Gen.* n. 5653.—B. H. *Gen.* 138, 974, n. 9.—Rodehiedia Miq. in *Linnaea*, xviii. 585.

<sup>4</sup> Mart. ex Benth. in *Ann. Mus. Vindob.*

ii. 93.

<sup>5</sup> Hochst. in *Flora* (1842), 229.—A. Rich. *Fl. Abyss. Tent.* i. 39, t. 10.

<sup>6</sup> Jacq. *Amer.* t. 183.—Deless. *Ic. Sel.* iii. t. 22.—A. S. H. *Fl. Bras. Mer.* ii. 67, t. 96.—Griseb. *Fl. Brit. W.-Ind.* 29; *Cat. Pl. Cub.* 14.—Hassk. in *Mus. Lugd.-Bat.* i. 190.—Hook. f. *Fl. Brit. Ind.* i. 207.—Oliv. *Fl. Trop. Afr.* i. 134.—Benth. *Fl. Hongkong.* 45.—Miq. *Fl. Ind.-Bat.* i. p. ii. 128 (*Lophostylis*).—Tr. et Pl. in *Ann. Sc. Nat.* sér. 4, xvii. 134.—Walp. *Rep.* i. 246 (part.); v. 67; *Ann.* i. 75; ii. 86; iv. 240; vii. 253.

<sup>7</sup> *Gen. Syst.* i. 370 (part.).—Endl. *Gen.* n. 5655; Suppl. iii. 96.—B. H. *Gen.* 139, 974, n. 11.

late, furnished with long hairs; embryo albuminous; cotyledons orbiculate thin.—Shrubs; leaves alternate ovate; flowers<sup>1</sup> in short axillary few-flowered racemes. (*Trop. W. Africa.*<sup>2</sup>)

9. **Trigoniastrum** MIA.<sup>3</sup>—"Sepals 5, of which two are slightly wider. Petals dissimilar; the lateral narrowly unguiculate-spathulate; keel navicular,<sup>4</sup> gibbous saccate at base; 2 at base extrorsely auriculate-semicordate, higher connate at margin, and concealing generative organs. Stamens 5, coalescing in sheath, which is afterwards cut; anthers ellipsoidal, 1-locular, introrsely adnate. Glands (?)<sup>5</sup> 2, subrotund-lenticular anterior in the neighbourhood of the germen, strictly enclosed in saccate base of keel. Germen 3-locular; style simple; stigma small; ovules in cell solitary pendulous from vertex. Fruit dry, 3-winged, in 3 carpels, samaroid, finally deshiscing inwardly, separating. Seed solitary in cell, pendulous hairy estrophiolate...—A shrub<sup>6</sup>; leaves alternate, coriaceous, entire; racemes at apex of branches paniculate; bracts glandular<sup>7</sup>" (*Sumatra, Penang.*<sup>8</sup>)

## II. XANTHOPHYLLEÆ.

10. **Xanthophyllum** ROXB.—Flowers irregular hermaphrodite; sepals 5, imbricate; the interior slightly larger. Petals 5, free or connate at base, imbricate; the posterior 4, rarely unequal; the anterior (keel) larger cymbiform. Stamens 8, either all free or cohering in pairs with petals at the base; anthers introrse 2-locular, shortly rimose at apex. Germen surrounded at base with annular glandular disk, 1-loculate; placentas 2, parietal, laterally more or less prominent; ovules in each 2-6, descendent or variously oblique; style incurved, stigmatiferous sub-entire at apex. Fruit globose, coriaceous-fleshy, usually 1-spermous; seed exarillate, exalbuminous; embryo fleshy; cotyledons thick-fleshy, plano-convex, at apex sometimes corrugate-plicate; radicle short, sub-enclosed between coty-

<sup>1</sup> White or yellow.

<sup>2</sup> Spec. 2, BENTH. *Niger*, 224.—OLIV. *Fl. Trop. Afr.* i. 135.—WALP. *Rep.* i. 247 (Spec. 3, 4).

<sup>3</sup> *Fl. Ind.-Bat.* Suppl. i. 394.—B. H. *Gen.* 139, n. 10.—*Isopteris* WALL. *Cat.* n. 7261.

<sup>4</sup> "Postica?" (B. H.).

<sup>5</sup> "Corpuscula 2" (B. H.).

<sup>6</sup> Scandens?

<sup>7</sup> Char. ex B. H. *loc. cit.*

<sup>8</sup> Spec. 1. *T. hypoleucum* MIA. *loc. cit.*—HOOK. *F. Fl. Brit. Ind.* i. 208.—*Isopteris penangiana* WALL. *loc. cit.*

ledons.—Glabrous trees or shrubs, sometimes scandent; leaves alternate coriaceous; flowers in super-axillary, simple, terminal racemes. (*Trop. Asia and Oceania*). See p. 76.

### III. KRAMERIEÆ.

11. **Krameria** LOEFL.—Flowers irregular resupinate; sepals 4, 5, coloured inside, imbricated; anterior larger exterior; 1, 2, posterior (of which 1 interior is smaller). Petals, posterior, 2 or 3; the middle one interior or 0; subfree, or more or less connate at base, narrow. Stamens 3, the posterior oppositipetalous, or more usually 4, 2-dynamis; the lateral larger, sometimes but rarely 5; filaments free or oftener at base more or less high 1-adelphous; anthers basifixed erect, 2-locular, infundibuliform, lacerate-subporicidal at apex. Germen free, furnished at base with 2 glands hypogynous anterior, thickly squamiform, compressed, rugose outwardly, sulcate or reticulate; fertile cell 1, anterior; style subulate, long-tubular, scarcely or not at all dilate, stigmatiferous at apex; ovules 2, collaterally inserted on prominent posterior placentas; micropyle anteriorly or laterally superior. Fruit dry, indehiscient, subglobose, outwardly aculeate at apex, sharply reflexed-uncinate; embryo of solitary descendent seed exalbuminous; cotyledons plano-convex fleshy, auriculate at base in a sheath round short superior radicle.—Humble canescent shrubs generally much ramified; leaves alternate, exstipulate, simple, or more rarely partly 3-foliolate; folioles pinnate articulate; flowers in axils of leaves or bracts on upper branches, solitary, pedunculate or subsessile; peduncle at middle 2-bracteolate. (*Trop. and subtrop. America*.) See p. 77.



## XL. VOCHYSIACEÆ.

### 1. SALVATERIA SERIES.

To this series belongs *Vochysia*, which has given its name to the family; but it does not represent the most complete type, as it has but three petals in a pentamerous flower, while *Salvateria*<sup>1</sup> (fig. 124–126), which we shall first study, has the same number of

*Salvateria convallariædora.*

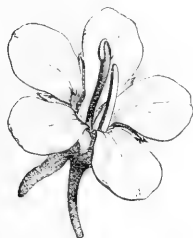


Fig. 124. Flower ( $\frac{2}{3}$ ).



Fig. 125. Diagram.

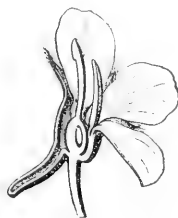


Fig. 126. Long. sect. of flower.

petals as sepals. The flowers are hermaphrodite and irregular, and the receptacle slightly concave. Upon the edges of the small cup which constitutes it, are inserted five sepals, imbricated in a varied manner in the bud, but generally quincuncially. Below the posterior sepal, the receptacle dilates as in the *Nasturtiums* into a hollow free spur.<sup>2</sup> The five petals, scarcely unequal, are imbricated in the bud like the sepals with which they alternate. The androecium is formed at first of five oppositipetalous stamens; but generally one of them, the anterior, alone becomes fertile, the two posterior disappearing com-

<sup>1</sup> A. S. H. in *Mém. Mus.* vi. 266; ix. 340. —DC. *Prodr.* iii. 28. —SPACH, *Suit. à Buffon*, iv. 324. —ENDL. *Gen.* n. 6072. —B. H. *Gen.* 977, n. 5. —H. BN. in *Payer Fam. Nat.* 351.

<sup>2</sup> Like that of the *Nasturtiums*, the flowers may also become monstrous, the spur enlarging, or diminishing, or disappearing more

or less completely; the perianth thus becoming apparently regular. In this case, there are often two large fertile stamens, more rarely three, one of which rather smaller, and the staminodes are more developed than in the normal flowers.

pletely or nearly so at the adult age, and the two lateral are usually only represented by two staminodes, very short in comparison with the fertile stamens. All are inserted slightly perigynously upon the edge of the receptacle, and the fertile stamen is formed of a free

*Vochysia guianensis*.



Fig. 128, 129. Entire stamen. Transverse sect.

Fig. 127. Portion of the inflorescence ( $\frac{1}{2}$ ).

Fig. 130. Dehiscent fruit.

Fig. 131. Open seed.

filament and a bilocular introrse anther with two distinct cells corresponding to the edges of the connective, and each dehiscing by a longitudinal cleft.<sup>1</sup> The gynæceum occupies the centre of the receptacle; it is formed of a three-celled ovary, surmounted by a style swollen into a club and presenting towards the obtuse summit an oblique stigmatiferous surface. In the inner angle of each cell, two of them being posterior and one anterior, are two collateral, descendent, incompletely anatropous ovules with linear hilum and superior exterior micropyle. The fruit is a triquetrous loculicidal capsule, the valves bearing upon the middle of their interior face a partition, on each side of which is a descendent seed. This is

<sup>1</sup> The pollen of several *Vochysiaceæ* of the series *Salvaterricæ* has been examined by H. MOHL. (in *Ann. Sc. Nat.* ser. 2, iii. 332), and described in different categories, "a flattened sphere with three angles, small papillæ on the angles (*Vochysia ferruginea*).—b. Spherical, tri-

angular at the equator, on the angles very short folds, on these the papillæ (*Qualea cæcarata*).—c. Ovoid; three folds; in water a sphere with the bands bearing papillæ (*Vochysia pyramidalis*, *Amphilchia qualeoides*, *Callisthene minor*)."

surmounted above by a long membranous wing, and encloses under its coats a much developed embryo, with short superior radicle, and wide not very thick cotyledons spirally convolute. At present only one *Salvertia*<sup>1</sup> is known. It is a tree from Brazil with resinous juice, thick branches, verticillate, petiolate, simple leaves.<sup>2</sup> The

*Callisthene minor*.



Fig. 132. Floriferous branch ( $\frac{1}{2}$ ).



Fig. 133. Flower (?).



Fig. 134. Long. sect. of flower.

flowers<sup>3</sup> are disposed in ramified terminal racemes, composed of cymes, sometimes uniparous at the apex.

*Vochysia* (fig. 127-131), consisting of trees from tropical America, has all the characters of *Salvertia*, but the sepals are very unequal and the petals are, as we have seen, three in number, the two posterior disappearing; or sometimes even the anterior petal alone represents the corolla. The *Vochysias* are trees with opposite or verticillate leaves, accompanied by small lateral stipules. The inflorescence is in racemes of cymes more or less ramified. Beside them are placed *Callisthene* and *Qualea*, also natives of

<sup>1</sup> *S. contraria: dora* A. S. H. loc. cit.—  
MART. et Zucc. *Nov. Gen. et Spc.* i, 152, t. 93.  
— ? *S. thyrsoflora* POHL, *Pl. Bras.* ii, 15, t. 1:0.  
WALP. *Rep.*, i, 69.

<sup>2</sup> Thick, coriaceous, oboval, entire, peninerved, exstipulate (?).

<sup>3</sup> White or pink, large, beautiful, very fragrant.

tropical America. The corolla is always reduced to one petal, the anterior one. The androecium also generally consists of only one fertile stamen; but the number of ovules in one cell is more than two. In *Callisthene* (fig. 132-134), the capsular fruit has a thick columella, which persists after the fall of the valves. In *Qualea*, the columella is wanting or scarcely developed. The ovary cells are often incomplete; the ovules, disposed obliquely in two rows at the back of the placentas, are incompletely anatropous or almost orthotropous, and already surmounted by a wing-shaped dilatation still more manifest in the seeds. The posterior spur is sometimes reduced to a very small size.

## II. ERISMA SERIES.

*Erisma*<sup>1</sup> (fig. 135-137), which alone constitutes this small series, has the externally irregular, pentamerous, monandrous flowers of

*Erisma violaceum.*



Fig. 135. Flower.



Fig. 137. Long. sect. of fruit.

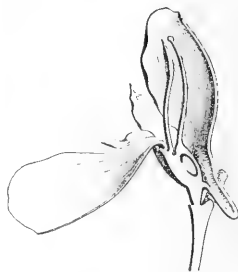


Fig. 136. Long. sect. of flower.

*Vochysia*, the corolla being also reduced to the anterior petal; but the ovary plunged in the concavity of the receptacle, obconical and spurred behind, is quite inferior as regards the insertion of the calyx,

<sup>1</sup> RUDGE, *Pl. Guian. Rav.* i, 7, t. 1 (1805).—DC. *Prodr.* iii. 29.—SPACH, *Suit. a Buffon*, vii. 328.—ENDL. *Gen.* n. 6073.—PAYER, *Elem.* 150, fig. 258-262.—H. BN. in *Payer Fam. Nat.* 352.

—B. II. *Gen.* 976, n. 3.—*Debræa* ROEM. et SCH. *Syst.* i. 4 (ex ENDL. loc. cit.).—*Dittmaria* SPRENG. *Syst.* i. 4 (ex ENDL.).

the petal and the stamen, and becomes what was formerly called adherent. There is only one cell, in which two collateral ovules are found, inserted upon the wall, on the side of the petal and fertile stamen, incompletely anatropous and ascending, with the micropyle directed outwards and downwards.<sup>1</sup> The style is single, slightly swollen at the stigmatiferous apex. The fruit is dry, indehiscent, applied obliquely in the concavity of the receptacle, with whose wall it is blended on one side, being surmounted by five sepals, unequally accrescent in coriaceous, reticulated wings, more or less falciform. In the cavity of the fruit are one or two narrow elongated seeds, whose coats cover a slightly arched embryo, with long narrow cotyledons, demi-cylindrical, having a short inferior radicle<sup>2</sup> (fig. 137). *Erismia*, of which there are three or four species,<sup>3</sup> consists of trees from northern Brazil or Guiana. The leaves are opposite, petiolate, coriaceous, accompanied by membranous stipules, caducous or persistent; and the flowers are disposed in terminal ramified racemes, of cymes, the pedicels bearing two lateral bracts.

### III. TRIGONIA SERIES.

*Trigonía*<sup>4</sup> (fig. 138-142) has irregular hermaphrodite flowers, whose receptacle is flat or slightly concave at the summit, generally cut a little obliquely from above downwards, and from behind forwards. It bears five unequal sepals, quineuncially imbricated in the bud, and five alternate dissimilar petals, also imbricated in præfloration. One of them is dilated above the base into a sac or short spur, and is placed laterally as regards the anterior-posterior plane of the flower.<sup>5</sup> Two others, symmetrical as regards each other, situated on the sides of the preceding, are thick and gibbous on one side. The two latter are also like each other, falling back outwardly

<sup>1</sup> Consequently looking backwards.

<sup>2</sup> It is a mistake that PAYER (*loc. cit.* fig. 262) has represented the ovule as descendent with superior micropyle, and that BENTHAM and HOOKER have described the radicle as superior.

<sup>3</sup> MART. et ZUCC. *Nov. Gen. et Spec.* i. 136, t. 82.—REICHB.  *Ic. Exot.* t. 161.—PÉTR. in *Frer. Not.* xxxv. 120.—WALP. *Rep.* ii. 69.

<sup>4</sup> AUBL. *Guian.* i. 390, t. 149, 150.—J

*Gen.* 253.—LAMK. *Ill.* t. 347.—POIR. *Diet.* viii. 97.—DC. *Prodr.* i. 571.—A. S. H. et MOQ. in *Mem. Mus.* xviii. t. 31, fig. 3.—ENDL. *Gen.* n. 5659.—H. BN. in *Payer Fum. Nat.* 352.—B. H. *Gen.* 977, n. 6.—*Mainea* VELLOZ. *Fl. Flum.* vii. 275, n. 264, t. 8.

<sup>5</sup> On the floral symmetry of *Trigonía* and *Lightia*, and on the two symmetrical plans of the flower, see H. BN. in *Adansonía*, xi. 23.

at anthesis. The scarcely perigynous androecium is formed of from four to twelve stamens, united among themselves by the base of their filaments into a short tube, cleft on one side, and becoming shorter the nearer they are to this cleft, toward the edges of which we only

*Trigonía villosa.*



Fig. 138. Flower ( $\frac{3}{4}$ ).



Fig. 139. Long. sect. of flower.



Fig. 140. Seed ( $\frac{3}{4}$ ).



Fig. 141. Long. sect. of seed.



Fig. 142. Bilateral long. sect. of seed.

see a variable number of staminodes. All the stamens are disposed according to a symmetrical plan, which is the same as that of the corolla, the staminodes and smallest stamens being found on the side of the spurred petal. The anthers are bilocular, introrse, dehiscing by two longitudinal clefts. The gynæceum is free, formed of an ovary with three cells, surmounted by a style, whose entire summit is dilated into a small head or into a stigmatiferous cupule cut straight or obliquely. In the inner angle of each cell is seen a placenta, bearing an indefinite number of descendent anatropous ovules. The fruit is a tricoccate septicidal capsule, whose numerous seeds are covered with long woolly hairs, and whose oblique embryo, with wide suborbicular, foliaceous cotyledons, is surrounded by a thick fleshy albumen. *Trigonía* of which at least twenty species are distinguished,<sup>1</sup> consists of sarmentose or climbing shrubs with

<sup>1</sup> H. B. K. *Nor. Gen. et Spec.* v. 141.—CAM-  
RESS. in *A. S. H. Fl. Bras. Mer.* ii. 80, t. 105.

—WALP. *Rep.* i. 248; ii. 769; *Ann.* i. 76; ii.  
86; iv. 240.

opposite simple leaves, accompanied by caducous stipules, and flowers disposed in more or less ramified and compound terminal racemes.

*Lightia*,<sup>1</sup> which connects the other *Vochysiaceæ* to *Trigonias*, is nearly allied to the latter, but distinguished from it by its receptacle which is more concave, and its perigynous petals reduced to three, the fertile stamens being only four in number, didynamous, and the ovary cells only containing two ovules. Two arborescent species<sup>2</sup> have been described, one from Guiana, the other from the Amazon.

This small family, distinguished in 1820 by A. S. HILAIRE,<sup>3</sup> has been considered by some as allied to the *Combretaceæ* and *Onagrariæ*, because of the perigynous character of most of its genera; by others to the *Geraniaceæ*, on account of the analogy often presented by its spurred flowers to those of the *Nasturtiums* and *Pelargoniums*; Lindley, considering them as inseparable from the *Polygalaceæ*, with which he even connected the *Trigonias*. By the intervention of the latter, the *Vochysiaceæ* should perhaps be placed in the same family with the *Polygalaceæ*, representing the perigynous series of them. They would be distinguished by their mode of insertion, although the concavity of the receptacle, so decided in *Lightia*, disappears almost completely in most of the *Trigonias*; and still more so by the irregularity of the androecium, normally reduced to a single fertile piece in all the *Vochysieæ* and *Erismææ*. An affinity has also been indicated between the *Vochysiaceæ* and the *Sapindaceæ*. It is principally manifest by the intervention of the *Chailloteæ* with irregular flowers like *Tapura*. When, however, we know the close relationship of the latter with the *Euphorbiaceæ* proper, especially with *Pedilanthus*, whose irregular flower much resembles that of the *Vochysiaceæ*, we can understand that *Trigonias* has often been connected with the family *Euphorbiaceæ*.<sup>4</sup>

The characters of the three series which we distinguish in this family are the following:—

<sup>1</sup> SCHOMB. in *Linnæa*, xx. 757.—B. H. *Gen.* 977, n. 7.

<sup>2</sup> WALP. *Ann.* i. 190.

<sup>3</sup> In *Mém. Mus.* vi. 253 (*Vochisiés*).—*Vochysieæ* DC. *Prodr.* iii. 25, Ord. 69.—E. MEY. in *Nov. Act. Nat. Cur.* xi. 812.—BARTL. *Ord. Nat.* 320.—H. BN. in *Payer Fam. Nat.* 350, Fam. 155.—*Vochysiaceæ* MART. et ZUCC. *Nov. Gen. et*

*Spec.* i. 123 (1824).—ENDL. *Gen.* 1177, Ord. 260.—*Vochysaceæ* LINDL. *Introd.* ed. 2, 87; *Veg. Kingd.* 379, Ord. 134.

<sup>4</sup> The *Clusiaceæ* and the *Marcgraviææ* (*Ternstroemiaceæ*) have been compared with the *Vochysiaceæ*, but we see scarcely any affinity between them.

I. SALVERTIÆ.—Ovary free, plurilocular. Cells containing two descendent ovules, with superior and exterior micropyle. One single fertile stamen.<sup>1</sup> Fruit capsular with winged seeds. Embryo exalbuminous, and cotyledons foliaceous convolute.—4 genera.

II. ERISMEÆ.—Ovary adnate to the concavity of the receptacle (adherent) unilocular, biovulate. Ovules descendent with inferior and exterior micropyle. One single fertile stamen. Fruit indehiscent, samaroid. Embryo straight, exalbuminous.—1 genus.

III. TRIGONIA.<sup>2</sup>—Ovary free upon the oblique receptacle, scarcely concave or very deep, with several bi-ovulate or multi-ovulate cells. Androecium irregular; several fertile stamens, unequal. Fruit capsular. Embryo straight, surrounded by albumen.—2 genera.

The secondary characters which, in this series, serve to distinguish the genera, are the greater or less concavity of the receptacle, the number of fertile stamens, the number of ovules in each cell, and the more or less decided anatropous character of the seeds, the thickness, consistency, persistence or disappearance of the central fruit columella. Those which, on the contrary, are constant in the family, are: the woody nature of the stems, the disposition on the leaves, opposite or verticillate (except in *Lightia*), the irregularity of the flowers and the perigynous insertion, except in certain *Trigonias* where it is scarcely indicated.

All the known species of *Vochysiaceæ*, some hundred, belong to the tropical regions of South America. They have but few useful qualities. Their resinous juice has not been much used, nor has the perfumed essence of the flowers.<sup>3</sup> The arborescent species furnish a useful wood. That of *Vochysia guianensis*<sup>4</sup> (fig. 127–131) is said to be hard but little durable. It is seldom that the plants have been introduced into our greenhouses, and the culture of them has not, I believe, been successful.

<sup>1</sup> Abnormally two or three.

<sup>2</sup> *Trigoniceæ* MART. *Consp.* 247.—ENDL. *Gen.* 1080.—Gen. *Polygalearum* LINDL. *Veg. Kingd.* 376.—Gen. *Malpighiaceis* affine J. *Gen.* 253.

<sup>3</sup> ENDL. *Enchirid.* 631.

<sup>4</sup> LAMK. *Ill.* t. 11.—DC. *Prodr.* iii. 26, n. 1.—

LINDL. *Veg. Kingd.* 380.—ROSENTH. *Syn. Pl. Diaphor.* 899.—V. *excelsa* Zucc.—*Vochy guianensis* AUBL. *Guian.* i. 18, t. 6.—*Cucullaria excelsa* W. *Spec.* i. 17. (*Itaballi. Copaiyê*, according to SCHOMBURGK.)



## GENERA.

### I. SALVERTIÆ.

1. **Salvertia** A. S. H. — Flowers hermaphrodite irregular; receptacle cupular, produced at back in free hollow spur. Sepals 5, inserted at margin of receptacle, imbricated. Petals 5, alternating with the sepals sub-equal, imbricated. Stamens 5, with the perianth slightly perigynous, oppositipetalous, 2 posterior often aborting; lateral small, sterile, varied in form, unequal; anterior fertile with subulate filaments; connective of basifixed anthers rather wide; cells linear-adnate at margin, introrsely rimose. Germen free; cells 3 (2 posterior) 2-ovulate; style elongated, gradually thickening from base, oblique, stigmatiferous at apex; ovules inserted at inner angle, collaterally descendent, incompletely anatropous; raphe linear; micropyle extrorse superior. Capsule ovate-3-quetrous, loculicidal 3-valved; valves septiferous at middle; central columella 0; seed oblong compressed, produced above in a wing; embryo exalbuminous; cotyledons foliaceous, spirally convolute; radicle short superior.—Resinous trees; branches thick; leaves verticillate, simple, coriaceous, petiolate; stipules inconspicuous (?); flowers (rather large) in terminal compound ramified compound racemes; pedicels 2-bracteolate. (*Brasília*.)

2. **Vochysia** J.<sup>1</sup> — Flowers nearly of *Salvertia*; sepals 5, very unequal (the posterior larger, the others small). Petals 1, or more

<sup>1</sup> Gen. 424 (*Vochisia*).—A. S. H. in *Mem. Mus.* vi. 166.—DC. *Prodr.* iii. 26.—SPACH, *Suit. à Buffon*, vii. 321.—ENDL. *Gen.* n. 6071.—B. H. *Gen.* 976, n. 4.—H. BN. in *Payer Fam. Nat.* 351.—*Vochy* AUBL. *Guian.* i. 18, t. 6 (nom.

anteponend. ?).—*Vochya* VANDELL in *Ram. Scr. Bras.* 69, t. 6.—*Salmonia* NECK. *Elem.* n. 808.—*Cucullaria* SCHREB. *Gen.* n. 11. — *Struckeria* VELLOZ. *Fl. Flum.* i. 8, t. 20.

usually 3, anterior, imbricated (2 posterior wanting). Other characters of *Salvertia*. Seeds sometimes outwardly gossypinous. Glabrous, or tomentose, trees or shrubs; leaves verticillate or more usually opposite; stipules small, subulate; flowers<sup>1</sup> in sub-simple or more often ramified cymiferous racemes; pedicels 2-bracteolate. (*Trop. South America*.<sup>2</sup>)

3. **Qualea** AUBL.<sup>3</sup>—Flowers nearly of *Tochysia* (or *Salvertia*); petal 1, anterior unguiculate, usually widely obovate or obovoid.<sup>4</sup> Stamens and gynæceum of *Salvertia*; germen incompletely or completely 3, 4-locular; ovules on each placenta  $\infty$ , 2-seriate oblique, oftener scarcely anatropous, produced above in ascending wing. Capsule loculicidal, 3-valved; columella usually 0; seeds  $\infty$ , 2-seriate imbricated subascendent, long produced above in a wing. Other characters of *Salvertia*—Resinous trees; leaves opposite or verticillate; petiole 2-glandular at base; flowers<sup>5</sup> in lateral and terminal racemes often ramified-compound. (*Brazil and Guiana*.<sup>6</sup>)

4? **Callisthene** MART.<sup>7</sup>—Flowers nearly of *Qualea*; germen cells 3,  $\infty$  ovulate. Capsule ovoid, crustaceous or ligneous, sometimes sub-drupaceous; endocarp separating from subcoriaceous exocarp and septicidally, or loculicidally 3–6-valved; valves solute from thickly 3-agonal semiferous and persistent columella. Seeds  $\infty$ , 2-seriate descendent, produced on both sides in a wing; embryo and other characters of *Qualea*.—Resinous trees; leaves sub-2-stichous, ovate or oblong; stipules minute; flowers<sup>8</sup> axillary or lateral, solitary pedunculate. (*Brazil*.<sup>9</sup>)

<sup>1</sup> Large or rather large, beautiful yellow, fragrant.

<sup>2</sup> Spec. about 40.—MART. et Zucc Nov. Gen. et Spec. i. 139, t. 83–92.—POHL. Pl. Bras. ii. 18, t. 111–119.—WALP. Rep. ii. 69; Ann. ii. 527.

<sup>3</sup> *Guian.* i. 5, t. 1, 2.—A. S. H. in *Mém. Mus.* vi. 265.—DC. Prodr. iii. 28.—ENDL. Gen. n. 6069.—B. H. Gen. 976, n. 2.—H. Bn. in *Payer Fam. Nat.* 352.—*Amphilochia* MART. Nov. Gen. et Spec. i. 127, t. 77.—DC. Prodr. iii. 26.—*Agardhia* SPRENG. Syst. i. 4 (nec CABR. nec Gt.).

<sup>4</sup> Spur short or 0 in *Q. cecalearata* MART. quæ *Schuechia* ENDL. (Gen. n. 6070), with

stamens sometimes large, 2; both fertile or one more or less petaloid.

<sup>5</sup> Yellow, pink or blue, rather large, beautiful; petal deciduous.

<sup>6</sup> Spec about 25 MART. Nov. Gen. et Spec. i. t. 77–81.—REICHB. Fl. Exot. t. 232.—WALP. Rep. ii. (*Schuechia*), 915; Ann. ii. 527.

<sup>7</sup> Nov. Gen. et Spec. i. 123, t. 75, 76.—DC. Prodr. iii. 25.—ENDL. Gen. n. 6067.—B. H. Gen. 976, n. 1.—H. Bn. in *Payer Fam. Nat.* 351.—*Callisthene* SPRENG. Gen. n. 22.

<sup>8</sup> Usually small or rather large.

<sup>9</sup> Spec. 5, 6.

## II. ERISMEÆ.

5. **Erisma** RUDGE.—Flowers irregular hermaphrodite; receptacle obconical concave, produced at back in a hollow spur. Sepals 5, inserted at margin of receptacle, unequal, persistent. Petals 1, anterior inserted with the calyx, unguiculate. Stamens 5, inserted with perianth; the anterior fertile, with subulate filament; anther introrse subhastate-lanceolate, 2-rimose; 4 posterior, unequal-rudimentary or all abortive. Germen inwardly and anteriorly adnate to receptacle, 1-locular; cell anterior; style slender, capitellate stigmatiferous at apex; ovules 2, collaterally inserted on posterior placentas, ascendent, incompletely anatropous; micropyle extrorse inferior. Fruit coriaceous, indehiscent, inwardly adnate to receptacle, persistent and crowned with accrescent unequal wing-shaped subfalcate coriaceous venose sepals. Seeds 1, 2 linear; embryo exalbuminous; cotyledons elongate-narrow semicylindrical; radicle inferior short.—Trees; leaves opposite petiolate coriaceous; stipules membranous, deciduous or persistent; flowers in ramified compound terminal racemes; pedicels 2-bracteolate. (*Guiana, North Brazil.*)—See p. 96.

## III. TRIGONIA.

6. **Trigonía** AUBL.—Flowers hermaphrodite irregular; receptacle oblique, sub-plane or rather concave at apex. Sepals 5, unequal, imbricated. Petals 5, alternate, imbricate, of which 2 are concave or cucullate, sometimes gibbous, or 1-laterally incrassate; 2 are ascendent membranous; the fifth saccate or galeate at base (lateral to the flower). Stamens 4–12, slightly perigynous; filaments connate at base in a short tube afterwards cut, from fissure, either antherless, small or shorter than the other fertile one; anthers introrse, 2-rimose. Germen free, oblique, 3-locular (extremely hirsute); style slender, truncate stigmatiferous at apex, sometimes oblique or cupular; ovules in cells  $\infty$ , descendent. Capsule 3-agonal, 3-locular, septical; valves septiferous at middle and solute from columella, the cartilaginous endocarp often separating there from the exocarp. Seeds  $\infty$ , involute in gossypinous wool; albumen thick fleshy; cotyledons of the straight transverse embryo foliaceous;

radicle short superior.—Scandent or sarmentose shrubs; leaves opposite, simple, shortly petiolate; stipules caducous; flowers in axillary or oftener terminal more or less compound ramified cymiferous racemes. (*North-Eastern South America*).—See p. 97.)

7. **Lightia** SCHOMB. — Flowers irregular; receptacle widely concave obconical. Sepals 5, unequal, imbricate. Petals 3, inserted with calyx at margin of receptacle, unguiculate, widely obovate-obcordate, convolute-imbricated. Fertile stamens 4, of which two are larger, and sterile ones 2–6, minute, all 1-adelphous at base; anthers fertile, oblong, introrsely 2-rimose. Germen inwardly adnate to sub-oblique receptacle, densely araneose, 3-locular; style elongate slender, capitellate, truncate or 3-lobulate stigmatiferous at apex; ovules in cells 2; one descendent; micropyle extrorse. Capsule oblong rounded, 3-locular, septicidal; horny endocarp of valves separating from exocarp; seeds . . .?—Trees or shrubs; twigs hirsute or tomentose; leaves alternate, entire petiolate; stipules minute, deciduous; flowers racemose; pedicels bracteate at base. (*Amazon regions of Guiana*).—See p. 99.

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## XLI. EUPHORBIACEÆ.

### 1. EUPHORBIA (SPURGE) SERIES.

Various descriptions have been given of the flower of the Euphorbias<sup>1</sup> (fig. 143-152). According to the earliest it is regular, hermaphrodite and pentamerous. The receptacle, varied in

*Euphorbia Lathyris.*



Fig. 143. Floriferous and fructiferous branch ( $\frac{1}{2}$ ).

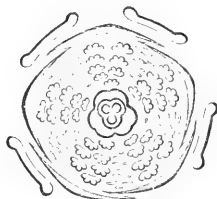


Fig. 145. Diagram.

form, would, in this case, bear a perianth surrounding an indefinite number of stamens, after which its organic summit would be elongated into a column supporting the gynæceum. The gamosepalous calyx, in the form of a bell or a more or less deep sac, is cut

<sup>1</sup> *Euphorbia* L. *Gen.* 243.—J. *Gen.* 385.—LAMK. *Dict.* ii. 412; Suppl. ii. 607; *Ill.* t. 411.—TURP. in *Dict. Sc. Nat.* Atl. t. 275.—A. JUSS. *Euphorb.* (*De Euphorbiacearum Gen. Med. Ear. Virt. Tentamen*, Paris [1824], in-4).—SPACH, *Suit. a Buffon*, ii. 530.—ENDL. *Gen.* n. 5766.—H. B.S. *Euphorb.* (*Etude générale du groupe des Euphorbaceæ*, Paris [1858], in-8), 4, 46, 280, t. 1, 2.—BOISS. in *DC. Prodr.* xv. sect. ii. 7; *Icon. Euphorb.* (1862), in-4.—BAKER, *Fl. Maurit.* 302.—TITHYMALUS T. *Inst.* 85, t. 18.—ADANS. *Fam. des Pl.* ii. 355.—GERTN. *Fruct.* ii. 115, t.

107.—*Euphorbium* ISN. in *Mém. Ac. Sc. Par.* (1720), 324 (incl.: *Adenopetalum* KL. et GRÜCKE. *Alectorocetomon* SCHILL. *Anisophyllum* HAW. *Anthacantha* LEM. *Arthrothamnus* KL. et GRÜCKE. *Athymalus* HAW. *Dactylanthus* HAW. *Dichrophyllum* KL. et GRÜCKE. *Esula* HAW. *Eumecanthus* KL. et GRÜCKE. *Euphorbiastrum* KL. et GRÜCKE. *Galarrhæus* HAW. *Keraselma* HAW. *Leptopus* KL. et GRÜCKE. (nec DCNE.), *Medusea* HAW. *Petaloma* RAFIN. *Poinsettia* GRAH. *Stegimanthe* KL. et GRÜCKE. *Synadenium* BOISS. *Tithymalopsis* KL. *Treisia* HAW. *Trichostigma* KL. et GRÜCKE.).

upon the edges in membranous lobes, generally five in number,<sup>1</sup> disposed in quincuncial præfloration in the bud. In the intervals are found as many, or a smaller number<sup>2</sup> of appendages, generally fleshy or glandular, very varied in form, sometimes petaloid and

*Euphorbia Lathyris.*

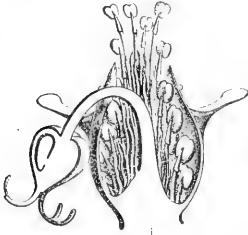


Fig. 146. Long. sect. of flower (♂).

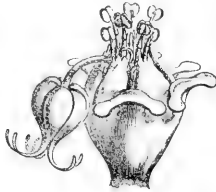


Fig. 144. Flower (♂).

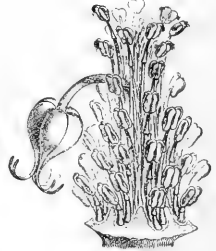


Fig. 147. Flower, the perianth taken away.



Fig. 149. Seed (♂).



Fig. 148. Dehiscent fruit (?).



Fig. 150. Long. sect. of seed.

much more developed than the true sepals, sometimes much cut and covered with numerous glands; their nature has been much discussed. The androecium is formed of an indefinite number of stamens, disposed in five bundles, and inserted on a line corresponding to the middle of the face of each sepal. In each bundle the stamens are alternately disposed in two unequal parallel series,<sup>3</sup> each formed of an articulate filament of variable height, from a certain age, and of a bilocular anther, dehiscing by two longitudinal clefts, lateral, or more or less extrorse.<sup>4</sup> In the intervals of the bundles of stamens are generally seen five tongues, or five

<sup>1</sup> There sometimes flowers with four, more rarely with seven or eight parts.

<sup>2</sup> One, two, the anterior often wanting, fig. 145.

<sup>3</sup> Shorter as they are more inferior in the bundle.

<sup>4</sup> The pollen is, according to H. MOUL (in

*Ann. Sc. Nat.* ser 2, iii. 338), "ovoid, three folds; in water spherical, with three bands, with papillæ upon the bands. *E. Peplus*, (oval umbilici placed lengthwise) *E. sylvestris*, *E. verrucosa*, *E. virgata*. In the three latter, the umbilici so large that there only remain a small border of the bands.

bundles of tongues, having no other connection with the filaments. The gynæceum,<sup>1</sup> supported by the central column of the receptacle, generally recurved outwardly at a certain age, is formed of an ovary with three cells (two of which are posterior), surmounted by a style with three branches, the summit, generally bifid, being furnished within or laterally with stigmatic papillæ. In the inner angle of each cell is seen an axile placenta, supporting an anatropous descendent ovule, with ventral raphe, and superior exterior micropyle,<sup>2</sup> the exostome thickening more or less, and being capped by an obturator, a mass of variable form springing from the placenta like a second ovule superposed to the first. Under the ovary is pretty frequently produced a hypogynous disk, entire or more or less distinctly 3-6 lobed. The fruit is a three-shelled capsule, whose pericarp, of variable thickness, sometimes more or less fleshy at first in the interior layers, finally becomes dry and opens elastically, at the same time separating from the central columella, on the dilated summit of which the seeds are inserted. The dehiscence is generally septicial then loculicidal; and the seeds, furnished outwardly with a fleshy arillate tunie through their whole length, or oftener only in the neighbourhood of the micropyle,<sup>3</sup> contain under their coats<sup>4</sup> an abundant albumen, fleshy and oily, surrounding an embryo with superior radicle and linear cotyledons more or less oval.

The genus *Euphorbia*, which belongs to all parts of the globe, and which, according to the most recent calculations, contains about seven hundred species,<sup>5</sup> woody or herbaceous, sometimes fleshy and

*Euphorbia fulgens.*

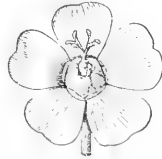


Fig. 151. Flower. (♂).

*Euphorbia globosa.*

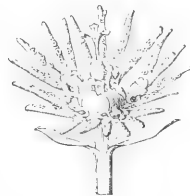


Fig. 152. Flower (♀)

<sup>1</sup> It sometimes aborts.

<sup>2</sup> With double coat.

<sup>3</sup> It comes from a thickening of the superficial coat situated more or less near to the micropyle.

<sup>4</sup> As in most of the *Euphorbiacæ*, three are distinguished: the interior placed immediately round the albumen white and membranous; the middle one testaceous, hard, thick, often breaking, dusky in colour, uniform or spotted with colour;

the exterior, generally thin, soft, then often dry at maturity, easily removed, formed of cellulæ and bundles of trachææ. These latter penetrating into the interior of the seed by a peculiar chalazic orifice pierced in the testa, are carried to a more or less elevated chalazic cup, forming there an interior channel which extends to a very variable height.

<sup>5</sup> KL. et GRÆKE. *Triaceæ*.—BOISS. *Prodr. l.c.*

*cactiform*, perennial or annual, frequently with milky juice, has been divided into a certain number of sections,<sup>1</sup> principally based on the exterior character of the seeds, of the glands alternating with the sepals, and upon the vegetative organs. The leaves, sometimes (especially in the species with thick stems) reduced to small tongues, are either alternate or opposite and unsymmetrical exstipulate, or with lateral stipules, membranous or glandular. The flowers, often preceded by coloured bracts, are disposed in more or less compound cymes, bi- or pluriparous, often uniparous, principally at the summit of the inflorescence, this being axillary, or more usually terminal, and frequently united in a umbelliform mass.

In some African species of *Euphorbia*, the glands alternate to the sepals, instead of being independent, are more or less widely united in a lobed ring: the genus *Synadenium*,<sup>2</sup> has been made of them, but we have only considered them as a section of *Euphorbia*.

Beside *Euphorbia* is placed *Pedilanthus*, representing the irregular form of it. The gynæceum and androceum remain the same, the calyx becomes extremely irregular, usually calceolate, generally as if bilabiate, with a posterior lip represented by the posterior division of the perianth, in itself bi- or tridentate, and an anterior lip formed of five sepals, larger and imbricated. Within the posterior lip is found a platform or furrow bearing one or a larger number of sessile glands. The species of *Pedilanthus* are American. Their vegetative organs are fleshy; their leaves alternate, and their flowers disposed in terminal or axillary cymes.

According to another opinion, that which we have just considered as the calyx<sup>4</sup> in *Euphorbia* and *Pedilanthus*, represents a multifloral

*cit.* 7-188, 1262-1269.—H. BN. in. *Adansonia*, i. 58, 104, 139, 291; ii. 211; iii. 139; iv. 257; vi. 282; vii. 159, 375; x. 197.

<sup>1</sup> M. BOISSIER (*Prodr.* 8) twenty-seven of them are admitted; 1. *Anisophyllum* (HAW. *Syn.* 159); 2. *Zygophyllidium* (BOISS.); 3. *Cyttarosperrum* (BOISS.); 4. *Dichilium* (BOISS.); 5. *Alectorocetnum* (SCHLETT. in *Linnaea*, xix. 252); 6. *Petaloma* (RAPIN. *Atl. Journ.* 177); 7. *Crossadenia* (BOISS.) 8. *Stachydium* (BOISS.); 9. *Tithymalopsis* (KL. et GRÜCKE, *loc. cit.* 33); 10. *Trichrostigma* (KL. et GRÜCKE, *loc. cit.* 41); 11. *Portulacastrum* (BOISS.); 12. *Chirolepidium* (BOISS.); 13. *Eremophytum* (BOISS.); 14. *Nannulariopsis* (BOISS.), 15. *Poinsettia* (GRAH. in *Edinb. New Phil. Journ.* (1836); (KL. et GRÜCKE, *loc. cit.* 101); 16. *Arthrothamnus* (KL. et GRÜCKE, *loc. cit.* 62 part.); 17. *Caulanthium* (BOISS.); 18. *Gonoistema* (H. BN. in *Adansonia* i. 114); 19. *Dia-*

*canthium* (BOISS.)—*Sterigmanthe* KL. et GRÜCKE, *loc. cit.* 100); 20. *Euphorbium* (BOISS.—*Dactylanthus*, *Medusa*, *Treisia*, HAW.;—*Anthacantha* LEM. in *Ill. Hort.* [1835], 69); 21. *Rhizanthium* (BOISS.); 22. *Tinucalli* (BOISS.); 23. *Lyciopsis* (BOISS.); 24. *Pseudacalypha* (BOISS.); 25. *Euphorbiustrum* (KL. et GRÜCKE, *loc. cit.* 101); 26. *Tithymalus* (BOISS.)—SCOP. (nec HAW.);—*Galarrhæus* HARV. *Syn.* 143);—*Esula* HARV. *Syn.* 153); 27. *Calycocarpus* (PL.) we have separated this last genus from *Euphorbia*, and we join as sections *Synadenium* (BOISS.) *Decadenia* (H. BN. in *Adansonia*, 213;—*Cleopatra* PANCH.), besides *Bongium* (BOISS. *Prodr.* 1264, s. 13 A.).

<sup>2</sup> BOISS. *Prodr.* 187, 1269.

<sup>3</sup> In *Adansonia*, iii. 142.

<sup>4</sup> Following the example of TOURNEFORT.



involucre (*Cyathium*). Each stamen constitutes a male monandrous flower, whose lower portion at the articulation of the filament would represent a receptacle. The alternate scales with the staminal bundles would form the calyces or epicalyces of the male flowers. The gynæceum, constituting a central female flower, the disk, which is sometimes observed below the ovary, would be a calycul or female calyx. This interpretation, which we consider inadmissible and useless, is the fashion at present, and most authors<sup>1</sup> follow it, and will follow it doubtless for some time in their works.

## II. RICINUS SERIES.

In *Ricinus*<sup>2</sup> (fig. 153–162), the flowers are regular and monœcious. On the convex receptacle of the male flower is inserted a calyx, formed of five sepals (or more rarely of a smaller number), definitely disposed in valvate præfloration. Within are very numerous stamens, whose ramified filaments in polyadelphous bundles are terminated by fine divisions, supporting at the apex a small bilocular extrorse anther, with short almost globular cells, dehiscing lengthwise.<sup>3</sup> In the female flowers there is only a calyx and a gynæceum. The former is similar to that of the male flower. The free, globular ovary has three cells, two of which are anterior. It is surmounted by a cylindrical style, soon divided into three elongated branches, flattened bi-partite, all bearing on their internal face and reflexed edges large stigmatic papillæ coloured red. In the inner angle of each cell is a descendent ovule, directed like that of *Euphorbia*, and capped by an analogous obturator. The fruit is three-shelled,<sup>4</sup> smooth, or generally covered with prickles, which

LINNÆ, ADANSON, B. MIRBEL, PAYER, etc., M. HIERONYMUS (in *Bot. Zeit.* (1872), n. 11–13) yet defends this opinion.

<sup>1</sup> A. L. DE JUSSIEU (*Gen.* 386) has spoken of this interpretation doubtfully after LAMARCK (*Diet.* ii. 412). R. BROWN definitely adopted it in 1814 (*Gen. Rem.* 556; *Misc. Works* [ed. BENN.], i. 32, this opinion is shared by A. DE JUSSIEU, ROEPER, WYDLER, etc. (see PL. in *Bull. Soc. Bot. de Fr.* viii. 29.—BOISS. *Prodr.* 8.—WARM. *Er. Kopp. hos Wortem* ... Copenh. [1871]; in *Adansonia*, x. 197.—F. SCHM. in *Flora* [1871], n. 27, 28.—M. ARG. in *Flora* [1872], 65.—CELAK, in *Flora* [1872], 153, etc.)

<sup>2</sup> *Ricinus*, T. *Inst.* 532, t. 307.—L. *Gen.* n. 735.—J. *Gen.* 383.—GERTN. *Fruct.* ii. 116, t. 107.—LAMK. *Ill.* t. 792.—POIR. *Diet.* vi. 200; Suppl. iv. 678.—TURP. in *Diet. Sc. Nat.* Atl. t. 276.—A. JUSS. *Euphorb.* 36.—NEES, *Gen.* ii. t. 38 (53).—SPACH, *Suit. à Buffon*, ii. 506, t. 76.—ENDL. *Gen.* n. 5809.—PAYER, *Organog.* 525, t. 110.—H. BN. *Euphor'iac.* 289, t. 10. 11.—M. ARG. *Prodr.* 1016.—BAKER, *Fl. Maurit.* 316.

<sup>3</sup> The pollen is "ellipsoid; three furrows; in water, spherical with three bands" (H. MOHL in *Ann. Sc. Nat.* sér. 2, iii. 338).

<sup>4</sup> Or exceptionally 4-coccate.

already existed in a soft state below the surface of the ovary. It opens elastically into six panels, and allows three seeds to escape,<sup>1</sup> (fig. 160, 161), whose coat is spotted, the exostome being thickened into a subglobular umbilicate bilobed caruncle. The embryo and

*Ricinus communis.*



Fig. 153. Habit ( $\frac{1}{2}$ ).

oilly albumen are analogous to those of *Euphorbia*. Several species of *Ricinus* have been described; but there is really only one very varied in form, *R. communis*,<sup>2</sup> a native, it is said, of India, and now naturalized in all warm countries. It there becomes arborescent,

<sup>1</sup> See A. GR. in *Ann. Sc. Nat.* sér. 4. xvii. 312.

<sup>2</sup> L. *Spec.* ed. 1, 1007.—M. ARG. *Prodr.* 1917. —*A. africanus* MILL.—*R. americanus* HORT.—*R. armatus* ANDR.—*R. badius* REICH.—*R. digitatus* NOR.—*R. euroæus* NEES.—*R. glaucus* HOFFM.—*R. hybridus* BESS.—*R. incrimis* JACQ.

—*R. Krappa* STEUD.—*R. levis* DC.—*R. leucocarpus* BERTOL.—*R. lividus* JACQ.—*R. macrocarpus* STEUD.—*R. medicus* FORSK.—*R. megalospermus* STEUD.—? *R. paniculatus* LINK.—*R. perennans* HORT.—*R. purpurascens* BERTOL.—*R. rugosus* MILL.—*R. rutilans* DESF.—*R. sanguineus* HORT.—*R. scaber* BERTOL.—*R. speciosus*

while when cultivated with us it presents all the characters of a tall annual herb with fistulous glabrous stem. At each node an alternate long petiolate leaf is inserted, peltate or not, palmatinerved or palmatilobed. The lobes are from five to eleven in number, dentate,

*Ricinus communis.*



Fig. 157. Female flower.



Fig. 155. Expanded male flower.



Fig. 154. Male flower.



Fig. 156. Bundle of stamens.



Fig. 158. Long. sect. of female flower (?).

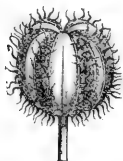


Fig. 159. Fruit.



Fig. 160. Seed.



Fig. 161. Long. sect. of seed.



Fig. 162. Embryo (?).

often glanduliferous, like the petiole. At the base of the petiole are found two lateral stipules, generally united in one membranous caducous sac, enveloping the young leaves at first. The inflorescence is terminal or oppositifoliate, in racemes of multiflowered cymes alternate and situated in the axils of bracts furnished with stipular lateral glands. The inferior cymes are normally male, and the superior female,<sup>1</sup> with sometimes mixed cymes between the two, in which the female flower is central. The pedicels are articulate.

Burm.—*R. spectabilis* Bl.—*R. tunisensis* Desf.—*R. undulatus* Bess.—*R. viridis* W.—*R. vulgaris* Moris.—*Catapuntia major* Ludw.—? *Croton spinosus* L. *Spec.* 1005.

<sup>1</sup> This becomes accidentally hermaphrodite (see H. Bx. in *Adansonia*, v. 65) like those of many Euphorbiaceæ.

Beside *Ricinus* is found *Homonoya*, consisting of shrubs from tropical Asia, whose flowers are constructed in the same way, the male calyx being generally trimerous, the cells of the anthers confluent, and the gynæceum being reduced to two carpels. The flowers of both sexes are in distinct spikes or racemes, and the leaves are penninerved. *Clælodiscus*, consisting of Indian plants, has also polyadelphous stamens, but the staminal bundles, instead of being inserted towards the centre of the flower, are thrown out toward the periphery of the receptacle, whose centre is occupied by a sort of circular concave disk.

### III. JATROPIA SERIES (Fr., *Médeciniers*).

*Jatropha*<sup>1</sup> (fig. 163-169) has unisexual flowers, almost always monœcious. The concave receptacle bears, in the male flowers, five<sup>2</sup>

*Jatropha Curcas.*

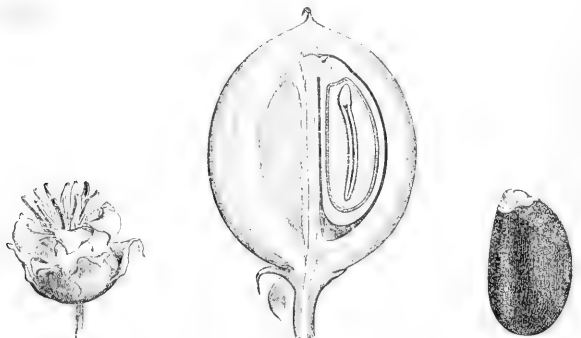


Fig. 163 Male flower (?).

Fig. 164. Long. sect. of fruit.

Fig. 165. Seed.

sepals free or united at the base, and disposed in quincuncial præ-floration in the bud. The petals are generally the same in number, free and contorted<sup>3</sup> in the bud. With them alternate five glands surrounding the foot of the androecium. This is formed of two verticils

<sup>1</sup> *Jatropha* L. *Gen.* 288.—Sw. *Obs.* 366.—J. *Gen.* 389.—DESROUSS. in *Lamk. Dict.* iv. 5.—*LAMK. Ill.* t. 791.—POIR. *Suppl.* iii. 616.—A. JUSS. *Euphorb.* 37, t. 11, fig. 34.—ENDL. *Gen.* n. 5805.—H. BN. *Euphorbiac.* 294, t. 14, fig. 10-27.—M. ARG. in *Linnaea*, xxiv. 207; *Prodr.* 1076. BAKER, *Fl. Maurit.* 321.—*Adenorhopium*

POHL, *Pl. Bras.* i. 12, t. 9 (incl. : *Bironea* RAFIN. *Bramfieldia* NECK. *Castigliona* R. et. PAV. *Cnidocolus* POHL, *Curcas* ADANS. *Jussievia* HOUT. *Loureira* CAV. *Mozima* ORTEG. *Ricinodendron* M. ARG.).

<sup>2</sup> Occasionally four or six.

<sup>3</sup> More rarely imbricated.

of five stamens, monadelphous at the base. The smaller, more exterior, are superposed to the petals, and provided with an introrse anther, dehiscing by two longitudinal clefts.<sup>1</sup> The largest, alternate with the preceding, has long filaments and anthers with extrorse or marginal dehiscence.<sup>2</sup> In the female flowers the perianth is generally the same, but the androecium totally disappears, or is only represented by one or two verticils of sterile tongues. The glands of the hypogynous disk are free or united among themselves, and the superior gynæceum is composed of an ovary with three cells, surmounted by a style whose three bifid branches are stigmatiferous above and within. In the inner angle of each cell, the placenta supports a descendent ovule, constructed like that of *Ricinus*, and surmounted in the same way by a cellular obturator.<sup>3</sup> The fruit is a capsule generally tricoccate, opening elastically, and allowing the arillate seeds to escape similar in all respects to those of *Ricinus* and *Euphorbia*.

*Jatropha (Cnidoscolus) aconitifolia.*

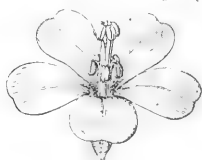


Fig. 166. Male Flower (♂).

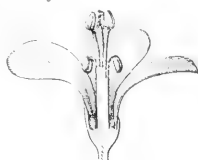


Fig. 167. Long. sect. of male flower.

In some species of *Jatropha*, the number of stamens is increased to twenty or thirty. In others, the male flower alone has a corolla, which is wanting in the female flower. In others, again, of which it has been thought a genus might be made, under the name of *Cnidoscolus*,<sup>6</sup> (figs. 166, 167), the petals disappear in the flowers of both sexes, when the calyx generally becomes petaloid. In *J. Curas* (fig. 163-165), and other analogous species, often also distinguished

<sup>1</sup> The pollen is "large spherical; exterior of membrane with large grains without folds: *J. panduræfolia*, *J. urens*, *Adenorhophium villosum*." H. MOHL, in *Ann. Sc. Nat.* sér. 2, iii. 337).

<sup>2</sup> The summit of the androecium column supports, in a certain number of flowers, a rudiment of a gynæceum, sometimes entire, sometimes trifid or tripartite, the existence of which has been contested (see *Adansonia*, xi. 134).

<sup>3</sup> The nucleus, prolonged beyond the exostome, at anthesis applies its dilated apex flattened or spatulate against the outer midrib of the obturator.

<sup>4</sup> POHL, *Pl. Bras.* i. 56, t. 49-52.—ENDL. *Gen.* n. 5807.—H. BN. *Euphorbiac.* 302, t. 19, fig. 3-9.—BIVONCA RAFIN, *Fl. Ludor.* 138 (nec. Mog. nec DC.).—JUSSIEU HORT. *Rel.* 6, t. 15.

as types of a particular genus,<sup>1</sup> the corolla not only being well developed, but the pieces united among themselves for some distance. The gamopetalous character is not real, although the petals may be united for a considerable distance, or even to the summit, in a singular species from tropical Western Africa, *J. Heudelotii*,<sup>2</sup> whose indehiscent fruit has a mesocarp thicker and more fleshy,<sup>3</sup> than the other *Jatrophas*.<sup>4</sup> This genus, thus limited, contains some seventy species,<sup>5</sup> natives of all warm regions.

*Jatropha (Mozinna) cordata*.



Fig. 168. Male flower (♂).



Fig. 169. Long. sect. of male flower.

They are frutescent or partly herbaceous, with alternate leaves, accompanied by stipules sometimes glandular, petiolate, with limb entire, dentate, or lobed, digitinerved, and sometimes even as in *J. Heudelotii*, compound of 3-5-folios. The flowers, rarely diœcious, are arranged in ramified clusters, often corymbiform, and composed of cymes, the female flowers, when they exist, occupying the centre. Most of them are milky plants. Those of the section *Chidoscolus* are generally covered with glandular hairs with a burning juice.

<sup>1</sup> *Cureas* ADANS. *Fam. des. Pl.* ii. 356.—ENDL. *Gen.* n. 5806.—H. BN. *Euphorbiac.* 313, t. 13, fig. 1-18; t. 19, fig. 10-11.—*Castiglionia* R. et PAV. *Prodr. Fl. Per.* 139, t. 37.—*Bromfieldia* NECK. *Elem.* ii. 347.—*Loureira* CAV. *Icon.* v. 17, t. 429, 430.—*Mozinna* ORTEG. *Nov. aut. Rar. Pl. Dec.* viii. 104, t. 13.—ENDL. *Gen.* n. 5814.

<sup>2</sup> H. BN. in *Adansonia*, i. 64; xi. 134.—M. ARG. *Prodr.* 1083, n. 17. This species has diœcious flowers.

<sup>3</sup> Which occurs, at least during a certain time, in other *Jatrophas*, such as *J. Cureas* (fig. 164). The result of the indehiscence of the pericarp is here, as often elsewhere, the slight development of the aile.

<sup>4</sup> I believe it is of the same plant that Mueller has made (*Prodr.* 1111.) his *Ricinoden-*

*dron africanus*, whose name, according to us becomes a section of *Jatropha*.

<sup>5</sup> H. B. K. *Nov. Gen. et Spec.* ii. 82.—HOOK. et ARN. *Beech. Voy. Bot.* 443 (*Chidoscolus*).—ANDR. *Bot. Rep.* iv. t. 167.—VAHL, *Symb.* i. 79, t. 21.—VENT. *Pl. Malmais*, 52, not.—BENTH. *Pl. Hartweg.* 8; *Sulph.* 165.—ROXB. *Fl. Ind.* iii. 638.—TORR. in *Mex. Bound. Surv. Bot.* 198.—HOCHST. in *Flora* (1845), 82.—DALZ. *Bomb. Fl.* 229.—THW. *Enum. Pl. Zeyl.* 277.—GRISEB. *Pl. Brit. W. Ind.* 36.—HOOK. in *Bot. Mag.* t. 4376.—SOND. in *Linnaea*, xxiii. 117.—M. ARG. in *Flora* (1864), 485; in *Linnaea* xxxiv. 207; in *Mém. Soc. Gen.* xviii. 449.—H. BN. in *Adansonia*, i. 63, 145, 342, 344, (*Cureas*); iii. 149; iv. 266, 284 (*Cureas*).

*J. Manihot* is become the type of a special genus under the name of *Manihot*, because in its apetalous flowers, very similar on that account to those of *Cnidocolus*, the staminal filaments, instead of being borne upon a column surrounded by the disk, are free for the greatest part of their length and are only united towards the base by a central body which spreads out between them to form a sur-based disk. The *Manihots* are herbaceous or frutescent, almost all natives of S. America.

Beside the preceding genera are placed: *Tannodia*, a shrub from Madagascar, having the flowers of *Jatropha*, small or united in spike-shaped cluster, the calyx however being valvate in the male flowers and imbricated in the female; *Tournesolia* (Fr., *Maurelle*), whose flowers, smaller than those of *Jatropha* but really constructed like them, are in both sexes provided with a valvate calyx, and have entire or more or less deeply cut petals, or these may be wanting in the female flowers. Almost all inhabit the warm regions, especially those of America, where they appear under the form of herbs, shrubs, or undershrubs, the organs generally impregnated with a reddish colouring matter. *Pausandra*, of tropical America, has from six to eight stamens, the exterior oppositipetalous, inserted round the central concavity of the receptacle.

*Monotaxis* forms close to them a small sub-series (*Monotaxideæ*), where the flowers, with the same general plan as the preceding genera, have a valvate calyx, distinct and pendant anther cells, and an embryo cylindrical or nearly so, with cotyledons nearly equal in size to the radicle, instead of being flattened, foliaceous, and much larger. This consists of Australian plants of peculiar habit, suffrutescent, with small ramified stems and narrow leaves recalling those of *Ericaceæ*.

In *Sarcoelinium*, consisting of shrubs from tropical Asia and America, the flowers, very similar to those of *Jatropha* and *Tournesolia*, have a valvate male calyx and an imbricated female one, petals the same or double in number to the sepals, two verticils (complete or incomplete) of introrse anthers, and flowers disposed in small cymes on the axis of spikes or racemes, sometimes very long. *Galearia*, from Malaysia and Java, has nearly the same flowers, but the calyx is valvate and the petals concave or formed like hoods in which are lodged the anther cells of the alternipetalous stamens. The ovary bi- or tri-locular becomes a coriaceous fruit, indehiscent

and monospermous. In *Johannesia*, a type also of a section (*Johannesiacæ*), the calyx is formed of a thick sac whose gaping opening is edged with four or five very short teeth. The petals are imbricated or contorted, and the rest of the flower is similar to that of *Jatropha*, *Sarcoelinium*, *Gulearia*. Only one species is known, a Brazilian tree, with compound digitate leaves and flowers disposed in compound cymes. *Aleurites*

*Aleurites (Elaeocæca) verniciflua*.



Fig. 170. Seed.

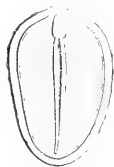


Fig. 171. Long. sect. of seed.

(Fr., *Bancoulie*), composed of trees from the warm regions of Asia and Oceania, has simple leaves digitinerved at the base and more or less cut. The flowers, fruits, and seeds (fig. 170, 171) are similar to those of the preceding genera, but the valvate calyx is irregularly divided into a variable number

of straps, and the stamens, instead of being indefinite in number, are united in large quantities upon a common elongated receptacle. *Sagotia*, consisting of trees with simple leaves from Guiana, has also numerous stamens at the centre of the male flower. The sepals and petals are imbricated and the male flowers have five alternipetalous glands which are wanting in the female flowers. *Chetocarpus*, composed of eastern India and tropical America, has also simple leaves. The tetramerous flowers have an imbricated calyx but no corolla, and from eight to sixteen stamens; they may thus be considered as a quarternary floral apetalous type of *Jatropha* or *Sagotia*.

*Hevea* constitutes a small sub-series in this group. The monœcious flowers are apetalous, and the gamosepalous calyx has long valvate or subinduplicate divisions. The introrse anthers, collected in one or two verticils, are applied vertically to the surface of a central erect cylindrical column, surmounted by a small terminal body. The ovary is surmounted by a column-shaped style. It consists of trees with alternate digitate trifoliolate leaves and monœcious flowers united, much ramified compound cymes. They are natives of north-eastern South America. (Guiana, Para.)

In *Trigonostemon*, formed of trees and shrubs of tropical Asia, the anthers may be like those of *Hevea*, extrorse collected upon a



central column, and there are some species of this genus where the number of the verticils and their total number may be the same; but there are some also where three verticils may be counted, and others where the androecium has only one verticil of three pieces. The perianth too is imbricated and often double, and the leaves are simple, penninerved, alternate or sometimes so nearly approaching each other as to represent verticils.

*Cluytia* also forms a small sub-series (*Cluytiæ*). With a particular habit, they have flowers (fig. 172) with double imbricated perianth. The insertion of the petals is more or less perigynous. The isostemonous androecium is formed of pieces borne upon a central column surmounted by a rudiment of a gynæceum. A double or single disk accompanies it at the base. All the known species of *Cluytia*, frutescent or suffrutescent, with alternate, simple, exstipulate leaves, inhabit South Africa or the neighbourhood of the Red Sea, especially Abyssinia and Arabia.

*Cluytia pulchella.*



Fig. 172. Female flower ( $\frac{1}{2}$ ).

In the small group *Pogonophoreæ*, *Pogonophora*, consisting of shrubs and trees of tropical America, has a double imbricated hypogynous perianth, with five free alternipetalous stamens, and in the female flower a trilocular ovary, surrounded by a membranous disk. The leaves are simple and alternate. It is the same in *Microdesmis*, a nearly allied genus, a native of tropical Western Africa, where an isostemonous species, and of Eastern India, where a diplostemonous species is found, furnished with five oppositipetalous stamens smaller than the other five. All are inserted round a rudiment of a central gynæceum, surrounded by an imbricated calyx and an imbricated or contorted corolla. The ovary and the fruit with hard stones have two or three cells. *Micrandra* is also very nearly related to *Pogonophora*, but the flowers are apetalous and the isostemonous androecium is formed of stamens alternating with the sepals whose filaments are incurved-refracted in the bud. It consists of Brazilian trees with alternate leaves. *Cunuria*, resembling *Tannodia*, *Jatropha*, and *Micrandra*, has the apetalous flowers of the latter, but with a diplostemonous androecium without any peculiar curvation of the filaments. The disk of the female flower is surmounted by six teeth (staminodes?), and the leaves of the only species known inhabiting North Brazil are alternate, thick, similar to those of many Guttifers. In *Mischodon*, a genus presenting great

analogy with the preceding types, the sepals are imbricated. The only species known is a tree from Ceylon, with simple, opposite or verticillate leaves of which a sub-tribe (*Mischodontæ*) has been made.

The genus *Codicum* is more nearly connected with *Aleurites* than the genera last mentioned by the indefinite number of its stamens united upon a central receptacle, but the double perianth of the flowers is imbricated, as in *Jatropha*, *Trigonostemon*, and *Sagotia*. It consists of trees and shrubs, with simple leaves alternate or opposite,

*Ricinocarpus pinifolia.*



Fig. 173. Male flower ( $\frac{3}{4}$ ).



Fig. 175. Male flower, without perianth.



Fig. 174. Long. sect. of male flower.

inhabiting the warm regions of Asia and Oceania. The *Ricinocarpus* (fig. 173-175), which is Australian, has the same flower as certain species of *Codicum*, but the leaves are often narrow and ericoid, and the seeds have an embryo with semi-cylindrical narrow cotyledons. In this way *Ricinocarpus* is to *Codicum* what *Monotaxis* is to *Jatropha* and *Tournesolia*. *Bertya*, Australian like *Ricinocarpus*, has the same organs of vegetation, embryo and central stamens indefinite in number, but the flowers are apetalous, and have as an envelope only a calyx often petaloid, surrounded by a caliciform involucre. *Beyeria*, also Australian, with the same foliage and embryo, apetalous like *Bertya*, destitute of epicalyx like *Ricinocarpus*, has a peculiar style whose summit dilates into a kind of conical surbased cap crowning the ovary. In *Alphandia*, inhabiting New Caledonia, the leaves are wide and membranous and the cotyledons foliaceous. The flowers have, as in the preceding genera, a great analogy with those of *Codicum*, but the calyx is gamosepalous, quinque-dentate, valvate in præfloration, and may be unequally cut as in certain species of *Aleurites* (Fr., *Bancoulie*). *Cocconerion*, consisting

of trees and shrubs from the same country, have nearly the same female flowers, but they are apetalous and without a disk, and like the leaves disposed in true verticils, one flower being found in the axil of each of the latter. *Fontainea* is also South Caledonian. It is a shrub with flowers nearly like those of *Alphandia*, with a sacciform valvate calyx, scarcely dentate at the summit, then splitting lengthwise; but the fruit is a drupe with osseous stone, generally reduced to one monospermous cell. The fruit is also drupaceous and monospermous in *Givotia*, an Indian tree having imbricated sepals and petals like those of *Codicium*. *Baliospermum*, consisting of herbs and shrubs from the warm regions of Asia and Oceania, have several cells to their capsular dehiscent fruit, but the flowers (of *Codicium*) are apetalous, with imbricated calyx. *Sumbavia*, formed of Indian and Javanese trees, have, on the contrary, small petals in the female flower. The calyx of the latter is valvate or slightly imbricated, and that of the male clearly valvate. The flower is nearly the same as that of *Givotia*, but the fruit is said to be capsular and three-shelled. It is the same with that of *Echinus*, better known under the name of *Rottlera*, belonging to all the tropical and sub-tropical regions of the Old World. The flowers are apetalous, the calyx being valvate. The stamens are introrse, extrorse, or with lateral dehiscence; in the middle a rudiment of gynæceum is sometimes observed. *Cheilosa*, of which only one Javanese species is known, is almost the same as *Echinus*, but the calyx is sometimes more or less imbricated instead of being valvate, and the several organs surrounded by a disk; the male flower is said to possess a rudimentary gynæceum. *Epiprinus*, consisting of trees from Malacca, have also a valvate calyx but without corolla, and with an indefinite number of stamens surrounding a rudiment of gynæceum; but each of the female flowers is surrounded by a caliciform involucre whose folioles persist and are accrescent round the fruit; a small group has been made of them, *Epiprinææ*.

In the *Garcieæ*, the calyx is valvate, breaking unequally at anthesis; but the petals are more numerous than the divisions. It is so in *Garcia*, a tree from the warm regions of America. *Crotonogyne*, from tropical Western Africa, presents the same peculiarity in the male corolla, but the petals are only five in the female flowers, and the seeds have a micropylar aril which is wanting in *Garcia*. The glands of the disk are distinct, while in those of *Garcia* the receptacle is covered with an unequal glandular layer.

*Manniophyton*, a native of the same country, is distinguished from *Crotonogyne* by the gamosepalous male corolla, and the female petals very slightly united at the base. In *Paracroton*, from Java, the flowers seem, according to the descriptions, analogous to those of the preceding genera, but they have a corolla like those of *Givotia*, and the calyx is imbricated. *Leucocroton*, consisting of shrubs from Cuba, has the valvate calyx of the *Garceae*, with three or four sepals, and from six to ten stamens only, surrounding a small rudiment of a gynæceum. The glands of the disk are alternate with the divisions of the calyx. *Pseudocroton*, from Guatemala, differs from *Leucocroton* by the development of the corolla, its non-elevated receptacle, and the large rudiment of free gynæceum in the centre of the stamens. *Suregada*, growing in the tropical regions of Asia,

*Suregada (Gelonium) bifarium.*



Fig. 176. Male flower (♂).

Australia, South and Eastern continental and insular Africa, have nearly the same flower with stamens generally more numerous; but the calyx is imbricated, and the receptacle becomes slightly glandular between the stamens, while the disk of the female flowers is the form of a cup. The fruit, more or less fleshy, finally opens like a capsule. *Elateriospermum*, consisting of trees from Java and Malacca, has nearly the same apetalous flowers as *Suregada*, and is only distinguished from it by its sub-drupaceous fruit, pulpous aril, and inflorescence in corymbiform cymes. *Acidocroton adelioides*, a thorny shrub from Cuba, similar to the preceding genera, is become the type of a small group (*Acidocrotonaceæ*) whose flowers have imbricated sepals, an equal number of petals, and an anther surmounted by a prolongation of the connective. This plant thus seems intermediate to *Jatropha* and *Tournefortia* on one side, and on the other to *Ricinella*, which consists of American shrubs, also often thorny, but whose calyx is valvate in both sexes, and the flower apetalous. These plants were formerly placed with *Bernardia*, natives of the same regions, but may be generically separated from them, because the calyx is valvate in both sexes, and the style branches, distinct from the base, are thrown out towards the circumference of the summit of the ovary, leaving this free.

*Adenophaedra*, from tropical America, are species of *Bernardia* with from 3-6 stamens inserted upon a non-glandular receptacle, and having anthers surmounted with a large gland. *Acidolon*, a shrub from Jamaica, has almost the same characters as *Bernardia*; but the insertion of the style is central, and the conical receptacle of the male flowers thickens into a glandular tissue between and outside the stamens. *Cleidion*, belonging to the warm regions of the Old World, except two American species, has also valvate sepals in the male flowers, the female ones being imbricated. The stamens are very exactly grouped in vertical series which are alternate and strictly imbricated; the style has two or three large bifurcate branches. *Eudospermum*, formed of trees from China, Malaysia, and Borneo, has a gamosepalous dentate calyx, imbricated when upright, and a variable number of stamens (from 6-10) disposed in two verticils, with peltate anthers 3-4-valved. The bilocular ovary is succeeded by an indehiscent monospermous fruit. *Erismanthus*, a shrub from Penang, has apetalous flowers, an imbricated calyx, oblique in the male flowers, from eight to fifteen stamens, introrse anthers, and a three-celled ovary. In *Ditta myricoides*, from Cuba, imperfectly known and doubtfully placed beside the preceding genus, the calyx of the female flowers disappears and the subdrupaceous fruit is borne upon a pedicel, with some entire or palmipartite bracts.

*Adriana* cannot be separated from the preceding types. It is Australian and consists of frutescent plants with opposite or alternate leaves, a valvate calyx in the male flowers, an imbricated one in the female without corolla and without disk, central stamens indefinite in number, and a three-shelled capsular fruit. *Neoboutonia africana*, placed beside it, has the same floral organization, with a disk well developed in both sexes. In *Trewia*, consisting of Asiatic trees with opposite leaves, the 3-4-merous apetalous flowers without disk are also very similar. The suberous indehiscent fruit has three or four cells, each containing an exarillate seed. *Lasioacroton macrophyllus*, a Jamaican genus, imperfectly known, is reported to have nearly the same flowers as the preceding, with an hypogynous disk in the female flower only, and a capsular fruit. *Pyrenocoma*, formed of trees and shrubs from tropical, continental, and insular Africa, are nearly related to *Trewia*, *Echinus*, and *Adriana*. They have large alternate elongated leaves, flowers in long racemes of one or two

sexes, often with the female flower at the apex. The fruit is capsular and the seed exarillate. The surface of the male receptacle thickens between the insertion of the stamens into a glandular layer. *Mabea*, belonging entirely to the hottest regions of America, has almost the flowers of a *Trewia*, a short calyx with divisions slightly imbricated or valvate, early ceasing to touch each other. The stamens, indefinite in number, are inserted on a conical or hemispherical receptacle. The female calyx is imbricated and the seeds have a micropylar aril. *Conceveiba*, almost entirely American, one species however inhabiting tropical Western Africa, has apetalous flowers with or without disk, a male valvate calyx, numerous stamens, extrorse or introrse anthers, and in the female flower from five to ten imbricated sepals furnished at the base like the bracts which precede them, with large marginal and dorsal glands. *Gavaretia*, a tree from North Brazil whose male flower is not known, has female flowers with dicarpellary gynæceum surrounded by a sacceiform calyx, with entire or slightly dentate superior opening. *Macaranga*, belonging to the warm regions of the Old World, is also apetalous, with an indefinite number of stamens, the praefloration of the male calyx being valvate and the female imbricate; but the anthers are three or four-celled with subpeltate insertion on the summit of the filament. The gynæceum sometimes with from three to six cells, oftener two in the species of which the genus *Mappa* has been made and only one with excentric insertion of the style in the true *Macarangas*. The leaves of these plants, often palminerved or peltate at the base, are, like most of the young organs, covered with waxy or resinous grains of a yellowish colour.

*Dysopsis*, a small Chilian herb, with the habit of some climbing *Cotyledons*, was formerly considered by us the type of a distinct series, because its small monœcious trimerous flowers have generally a diplostemonous androceum. The six stamens are disposed in two verticils. They have introrse anthers, the three smallest being sometimes wanting. The female flower has an ovary with three cells, superposed to the sepals, is supported by a capillary peduncle, finally much elongated. The *Mercurys* (fig. 177-184), plants from all warm and temperate climates of the Old World, much resemble *Dysopsis*, but their flower is more complicated. The stamens are almost always indefinite in number, with cells more or less inde-

pendent of each other, sometimes pendent and sometimes ascendent, extrorse, lateral, or introrse. The gynæceum, formed of two or three carpels, is often accompanied by a hypogynous disk, whose elements, linear or squamiform, alternate with the carpels. The species with ascendent stamen cells are sometimes herbaceous, but more generally woody and arborescent. The species of *Mercurialis* of the section

*Mercurialis annua*.



Fig. 177. Male stalk.

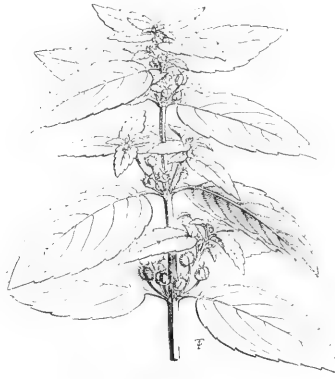


Fig. 179. Female stalk.



Fig. 178. Male flower ( $\frac{1}{2}$ ).



Fig. 180. Female flower ( $\frac{1}{2}$ ).



Fig. 181. Female flower, without gynæceum.



Fig. 182. Normal female flower seen from above.



Fig. 183. Female flower with four sepals.



Fig. 184. Female flower with five sepals.

*Erythrococca* are woody and thorny; finally, several herbaceous Cape species have an androceum reduced like that of *Dysopsis* to three stamens. *Tetrorchidium*, consisting of shrubs from tropical America, have nearly the same vegetative organs and flowers as the species of *Mercurialis* forming the sub-genus *Claorylon*; but their stamens are

superposed to three leaves of the calyx, each being formed of four cells representing, perhaps, a pair of anthers. The præfloration of the sepals is valvate or nearly so in the male flowers, imbricated in the female, and in the intervals three petaloid pieces are seen, representing a disk similar to that of *Mercurialis*. *Hasskarlia*, formed of shrubs from tropical Western Africa, has the male flowers of *Tetrorchidium*, the male sepals being clearly valvate. It differs only from the latter genus by the petaloid pieces of its female disk, which alternate with the ovary cells instead of being opposite to them, the cells themselves alternating with the sepals in *Tetrorchidium*, while they are superposed in *Hasskarlia*.

*Acalypha* (fig. 185–189), which has often served as the type of a tribe of this family, to which it yet gives its name, is easily dis-

*Acalypha phleoides*.

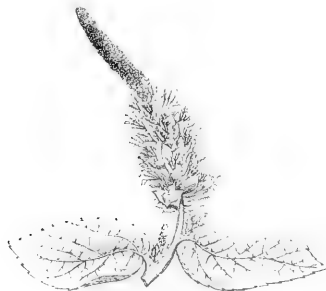


Fig. 185. Floriferous branch.



Fig. 186. Stamen ( $\frac{2}{1}$ ).

tinguished by its male flower with four valvate sepals, by its diplostemonous androecium, and the worm-shaped form of the anther cells attached on each side towards the summit of the filament, and more or less elongated and folded upon themselves in the bud (fig. 186–187). The female flowers, having three or four imbricated sepals, are also remarkable in most cases on account of the accrescent dentate bracts which accompany them, and by the great development of the ramified style-branches. This genus consists of herbaceous suffrutescent and frutescent plants from all hot regions. *Alchornea*, consisting of woody plants from all tropical and sub-tropical regions, has nearly the same floral organisation, a valvate calyx in the male flower with two or three divisions, and an imbricated one in the female with from four to six divisions,



four stamens, or eight in two ranks, or a larger number, indefinite. The filaments are free or united below in a ring; the anthers are introrse or extrorse, without any peculiar shape, and the gynæceum di- or trimerous, surrounded or not by a hypogynous disk, is

*Alcalypha phleoides.*



Fig. 188. Female flower.



Fig. 187. Male flower (♂).



Fig. 189. Long. sect. of Female flower.

surmounted by a style with entire or bifid branches. *Mareya*, a small tree from tropical Western Africa, is nearly allied to the preceding genus, whose perianth it has. The stamens, indefinite in number, are inserted upon a glandular receptacle, the cells hanging at first distinct from the connective, afterward rising. The fruits are capsular and the seeds exarillate. *Cephalomappa* of Borneo has numerous female sepals and 2-3-androus male flowers united in globular capitules. *Ramelia*, a small shrub from New Caledonia, represents a reduced type of *Cleidon* and *Alchornea*. Its trilocular ovary is surmounted by a style infundibuliform at the base, then divided into three almost petaloid stigmatiferous branches, the male flower, with valvate calyx, only containing two or three stamens which alternate with the sepals. *Caryodendron*, a large tree from the Orinoco, is distinguished by its male flowers, with valvate calyx and four stamens, surrounded by a perigynous disk, which spreads over the bottom of the flowers of both sexes, by its pendent anther cells, and its large fruit, probably indehiscent, of the size of a nut, with edible seeds. *Platygyne*, a volubile shrub, with burning hairs, growing in Cuba, has stamens almost definite in number (from five to eight), borne upon a receptacle, with truncate or concave apex, and a female calyx with from five to seven leaves, imbricated or almost valvate, surrounding a trimerous gynæceum.

*Ampera*, consisting of Australian suffrutescent plants, often with spartoid branches and narrow leaves, sometimes very little developed,

have been made into a special tribe (*Amperceæ*), principally on account of the semi-cylindrical form of their cotyledons, nearly equal in size to their radicle. Their calyx is valvate in the male flower, and imbricated in the female, as in most of the preceding genera. The diplostemonous androecium is formed of stamens, whose anthers, with wall-shaped cells, much recall those of our indigenous *Mercuriales*; it is sometimes surrounded by a disk with elongate glands. *Calycopeplus*, formerly ranked among the *Euphorbiaceæ*, has the spartoid habit of *Amperca*, opposite glandular leaves very little developed, and flowers also in cymes. The terminal flower is central and composite, as in *Amperca*, having a trimerous gynæceum, with uniovulate cells and a perianth with six divisions; the male flowers, disposed in biparous cymes, are peripheral, each reduced to a small perianth and one single stamen, with anther looking outwards. *Cnesmone javanica*, a climbing shrub with large leaves covered with hairs, has only an isostemonous androecium, in the male flowers apetalous and trimerous. The female flower is, on the contrary, nearly that of *Amperca*, presenting a trimerous gynæceum, surrounded by an imbricated calyx. The anthers are surmounted by a long prolongation of the connective, a kind of articulate rod, incurved-geniculate, which, in the bud, folds itself within on the face of the anther. This organ does not exist in *Tragia*, which has the same perianth as *Cnesmone*, with a number of pieces varying from three to eight in the female flower, where it is imbricated. The stamens are equal in number to the pieces of the perianth with which they alternate, or fewer in number (so that with three sepals there are only two or one stamen), or even, again, double in number or indefinite, on several verticils, with extrorse or introrse anthers. In the latter case they are accompanied by a variable number of glands. *Tragia* consists of volubile hispid plants from all warm climates, principally tropical America. In *Zuckertia*, a Mexican bind-weed, nearly allied to *Tragia*, the flowers are eglandular, the male calyx is pear-shaped in the bud, and the stamens, indefinite in number, form a large central bundle. The filaments are united quite at the base, and the elongated anthers are extrorse. The three-celled ovary, surrounded by a variable number of sepals, is surmounted by a style whose common basilar part is swollen into a club before separating into three revolute branches. *Leptorachis*,

containing one American and one South African species, also much resembles *Tragia*. The numerous stamens, with elongated basifixed anthers, adhering dorsally by their whole length to the connective, are inserted on a convex receptacle. The female have a variable number of imbricated sepals, entire in the American species, pinnatifid in the other. In *Bocquillonia*, consisting of woody plants from New Caledonia, the valvate calyx of the male flowers, inserted on the wood of the branches, envelops only two or three small stamens slightly monadelphous, with or without a rudiment of gynæceum. The trimerous ovary is surrounded by an imbricated calyx. In *Cladogynos*, a native of Timor, there are said to be four monadelphous stamens and a trilocular ovary, surmounted by a style with three glandular plumose branches. This genus thus, it would seem, allied to *Cephalocroton*, consists of shrubs from India and tropical Eastern Africa, continental and insular, whose male flower presents round a central column (rudimentary gynæceum) from four to eight stamens with introrse anthers, supported by a filament often twice folded upon itself near the summit. The calyx of the female flower is formed of from four to six imbricated pieces, more or less deeply cut upon the edges. *Calodapas*, a Javanese tree, seems to differ from the preceding genus only by the independent and suspended anther cells. In *Symphyllia*, formed of Indian shrubs, the characters of the flowers are nearly the same as in *Cephalocroton*; but the habit and inflorescence are very different. The leaves are almost always collected in verticils at the summit of the branches; the flowers are grouped in ramified spikes; the male flowers are 3-5-merous; the anthers erect and emarginate round a rudiment of gynæceum.

*Sperostylis* owes its name to its ovary, surmounted by a ball-shaped style, much larger than itself; it has a trimerous triandrous male flower, similar to that of *Tragia*, and five or six sepals in the female flower. Only one species is known, a native of Madagascar. In *Astrococeus*, consisting of trees from N. Brazil, the male flower is tetramerous, isostemonous, and the style is much developed, surmounting an ovary with a large obovoid mass or reversed pyramid. *Angostyles*, a tree from the same country, has also an enormous style simulating a thick infundibuliform corolla. The stamens are indefinite in number and have their short filaments united

at the base. *Fragariopsis*, consisting of climbing shrubs from Brazil, owes its name to its androecium, formed of a very variable number of anthers, applied upon the conical surface of a glandular receptacle. The quadrilocular ovary is also surmounted by a wide obpyramidal style bearing above four small stigmatiferous lips. All these genera recall the organisation of *Plukenetia*, which has also a large style, of variable form, almost spherical or obpyramidal, with stigmatiferous lips more or less prominent, a fruit with three or four shells, more or less projecting or horned, and anthers indefinite in number, four-lobed, extrorse, inserted on a conical or hemispherical receptacle. This genus is found in America, Africa, and tropical Oceania.

*Dalechampia* (fig. 190–195), of which a special tribe has been made, should, it appears to us, only form a sub-series near the preceding genera. It has a great analogy with *Plukenetia*, the style

*Dalechampia (Cremophyllum) spathulata.*



Fig. 190. Inflorescence seen from the side of the female flower.

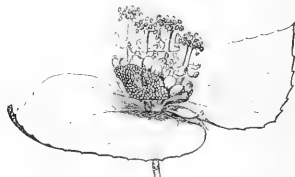


Fig. 191. Inflorescence seen from the side of the male flower.

being also in one piece, but more elongated in a club or column, with stigmatiferous lobes little developed, corresponding to the

*Dalechampia (Cremophyllum) spathulata.*



Fig. 192. Long. sect. of inflorescence.

ovary cells or to the interposed partitions (fig. 194, 195). The receptacle, bearing an indefinite number of stamens, becomes a column longer and thinner. The flowers of both sexes are collected in a contracted mass, surrounded by two bracts, often coloured, forming a general involucre to the inflorescence. There is also a special in-

volucre for the male flowers united in a capituliform cyme, and for the female, forming without and below the males, a small three-flowered cyme. Species of *Dalechampia* have been found in all hot regions.

It is by the presence of many-flowered involucre simulating at first simple buds, that *Pera* is also characterised. Of this a tribe, and even a distinct family, have been made (*Prosodipoelineæ*). Each involucre is cleft lengthwise and lays bare a small group of flowers,

*Dalechampia (Cremophyllum) spathulata.*



Fig. 194. Female flower ( $\frac{2}{3}$ ).

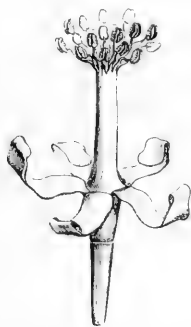


Fig. 193. Male flower ( $\frac{2}{3}$ ).



Fig. 195. Long. sect. of female flower.

male or female; the former apetalous, often accompanied by lateral rudiments of female flowers, and the female sometimes destitute of real perianth. *Pera* consists of trees from the warm regions of America, whose leaves, alternate or rarely opposite, and exstipulate, recall generally those of *Lauraceæ* or *Monimiaceæ*.

#### IV. CROTON SERIES.

The flowers of *Croton*<sup>1</sup> (fig. 196–203), are regular or nearly so, monœcious or more rarely diœcious, with a little convex receptacle.

<sup>1</sup> L. Gen. n. 1083 (part.).—ADANS. *Fam. des pl.* ii. 355.—J. Gen. 389 (part.).—LAMK. *Dict.* ii. 203 (part.); Suppl. ii. 404; *Ill.* t. 790.—GEISEL. *Crot. Monogr.* HALKE (1808).—A. J. C. S. *Euphorb.* 28, t. 8, fig. A.—ENDL. *Gen.* n. 5827.—H. BN. *Euphorbiac.* 349, t. 17, 18, fig. 1–7.—BAKER. *Fl. Maurit.* 309.—M. ARG. *Prodr.* 512 (incl.: *Andrichnia* H. BN. *Angelandra* ENDL. *Anisophyllum* B. V. N. (nec

HAW.) *Argyrodendron* KL. (part.), *Astraea* KL. *Astræopsis* GRISEB. *Astrogynæ* BENTH. *Barhamia* KL. *Brachystachys* KL. *Brunsvia* NECK. *Calyptriopetalum* KL. *Cascarilla* GRISEB. *Cinogasum* NECK. *Cleodora* KL. *Codonocalyx* KL. *Crotonanthus* KL. *Cyclostigma* KL. *Decarinium* RAFIN. *Drepadenium* RAFIN. *Eluteria* GRISEB. *Engelmannia* KL. *Eutropia* KL. *Furcaria* B. V. N. *Geiseleria*

In the male flower, it bears first a calyx of five (more rarely of four or six) sepals, free or united at the base, quincuncially imbricated or valvate in præfloration. The alternate petals are the same in

*Croton Tiglium.*



Fig. 196. Flower-bearing and fruit-bearing branch ( $\frac{1}{3}$ ).

number, valvate or more or less imbricated in the bud, sometimes too narrow for their edges even to touch. Between the petals is seen an equal number of alternate glands (fig. 197), sometimes very small, or even quite disappearing. The androceum, in two verticils, the pieces being often the same in number as the sepals or petals, is often diplostemonous; there are, in this case, five stamens alternate

KL. *Gynamblosis* TORR. *Heudecandra* ESCHR. *Hep-*  
*tallon* RAFIN. *Klotschiphytum* H. BN. *Lasiogyne*  
KL. *Leucadenia* KL. *Medea* KL. *Micranthis* H.  
BN. *Microcroton* GRISEB. *Monguia* CHAPEL.  
*Myriogomphus* DIEDR. *Ocalia* KL. *Palanostigma*

MART. *Petalostigma* MART. (nec F. MUELL.),  
*Pilinophyllum* KL. *Pedocalyx* KL. *Podostachys*  
KL. *Ricincarpus* BOERH. *Ricinoides* T. *Stolida-*  
*danthus* H. BN. *Tiglitum* KL. *Timandra* KL. (?)  
*Tridesmis* LOUR.

with the petals, and five a little shorter superposed to them. Each is formed of a free filament incurved in the bud, and a bilocular anther, dehiscing by two longitudinal clefts, introrse, but with the face

*Croton Tiglium.*

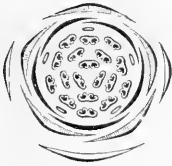


Fig. 197. Diagram of male flower.



Fig. 198. Long. sect. of female flower ( $\frac{7}{8}$ ).



Fig. 199. Diagram of female flower.



Fig. 201. Fruit.

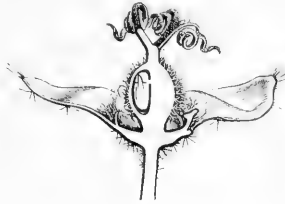


Fig. 200. Long. sect. of flower ( $\frac{5}{8}$ ).



Fig. 202. Seed.

looking outwards before anthesis, on account of the incurvation of the filament. In the female flower, the calyx, oftener valvate than imbricated, has sepals which may be from four or five to ten or a dozen. The petals, rarely as much developed as in the male flower and having the same form, are generally narrow, short, glanduliform and may even disappear altogether. They generally alternate with five independent or more or less united glands of a hypogynous disk surrounding the base of a sessile ovary, generally trilobular. In each cell is found a descendent ovule, with exterior and superior micropyle, capped by an obturator of varied size. The style is early divided, often even from the base, into three bifid or several times dichotomous branches, sometimes even much ramified. The capsular, tri-cocccate fruit is provided with a central columella. The bivalve shells each contain a descendent seed, analogous to that of the *Euphorbeæ* and *Ricinus* (fig. 202), whose micropyle is accom-

panied by a fleshy aril, and an abundant oily albumen surrounding an embryo with cylindrical-conical radicle, and large foliaceous cotyledons.

There are some species of *Croton* differing from those we have just described by a slight inequality of their pieces of the calyx, and by the extremely variable number of those forming the andro-

*Croton penicillatum.*



Fig. 203. Male flower (?).

ceum. This may be isostemonous; but it more frequently presents four or a greater number of verticils (fig. 203), whose pieces are alternately superposed to those of the calyx and the corolla, the interior verticil being complete or incomplete; or the number of stamens may increase in each verticil. This genus contains some four hundred and fifty species<sup>1</sup>, arborescent, frutescent, or herbaceous, rarely annual. The leaves are almost always alternate, with or without stipules, the latter being often glanduliform. The limb, penninerved or 3-5-plinerved, often entire, is sometimes dentate or lobed. It is rarely glabrous, much oftener covered with simple, stellate, peltate, or scaly hairs; here and there it bears glands whose situation is extremely variable.<sup>2</sup>

The flowers are in terminal or axillary, simple or ramified racemes or spikes, composed of cymes or glomerules. When they are monœcious, the females, generally few in number, occupy the axils of the inferior bracts of the inflorescence.

Beside *Croton* are placed three American genera, with the same general organisation of the androceum, but easily distinguished: *Julocroton*, by its resupinate flower, with two unequal sepals behind, and another (generally the most developed) in front; *Crotonopsis*, by its ovary reduced to one uniovulate cell, and the small fruit remaining dry and indehiscent; and *Eremocarpus*, by its dry one-celled fruit dehiscing in two valves, while the calyx disappears in the female flowers, and the corolla in those of both sexes.

<sup>1</sup> M. Ang. *Prodr. loc. cit.* 514-700, 1273; in *Flora*. (1872), 4.—H. Bn. in *Adansonia*, i. 67, 146, 170, 232, 346; ii. 217; iii. 154; iv. 289; vi. 16, 300.

<sup>2</sup> They often represent hairs or other acces-

sory organs, and are scattered over the surfaces; they correspond besides to the extremities of the dilated nerves, or they are the lobes of the leaves, or stipules transformed. (See H. Bn. *Euphorbiac.* 230).



## V. EXCÆCARIA SERIES.

*Excæcaria*<sup>1</sup> (fig. 204–214) has regular flowers monœcious or more rarely diœcious and di- or trimerous. In the typical species of the

*Excæcaria Agallocha*.



Fig. 205. Diagram of male flower.



Fig. 204. Male flower (♂).



Fig. 206. Diagram of female flower.

genus, for example, in that which yields the false Eagle or Calambac Wood, *i.e.*, *E. Agallocha*, the calyx is composed of two or, much

*Excæcaria (Maprounea) guianensis*.



Fig. 208. Female flower (♀).



Fig. 207. Male flower.



Fig. 209. Long. sect. of female flower.

oftener, of three sepals, the two anterior imbricated in præfloration, and the androecium of two or three alternate stamens each formed of a

<sup>1</sup>L. Gen. 1102 (1737).—J. Gen. 390.—LAMK. Diet. i. 47; Suppl. i. 154.—A. JUSS. Euphorbiac. 52.—ENDL. Prodr. Fl. Norfolk, 82; Gen. n. 5772.—KL. in *Erchs. Arch.* vii. (1841), 182.—H. BN. Euphorbiac. 517; in *Adanson*, xi. 120.—M. ARG. Prodr. 1201 (incl.: *Actinostemon* KL, *Adenogyne* KL, *Adenopeltis* BERT, *Ægopricon* L. Bonania A. RICH. *Clonostachys* KL, *Cnemidostachys* MART, *Colliguaya* MOL, *Commia* LOUR, *Conosapium* M. ARG. *Dactylostemon* KL, *Ditry-*

*sinia* RAFIN. *Elachocroton* F. MUELL. *Falconeria* ROYL. *Fragiopsis* KARST. *Gussonia* SPRENG. *Gymnanthes* SW. *Gymnarrhæa* LEANDR. *Gymnobotrys* WALL. *Gymnostillingia* M. ARG. *Maprounea* AUBL. *Microstachys* A. JUSS. *Protaxanthos* DIEDR. *Sapiopsis* M. ARG. *Sapium* JACQ. *Savathrostachys* KL. *Sclerocroton* HOCHST. *Sebastiania* SPRENG. *Spirostachys* SOND. *Stillingia* BOJ. *Stillingia* GARDEN. *Teniosapium* M. ARG. *Triadica* LOUR.).

filament inserted at the centre of the flower and of a short extrorse anther, with two cells adnate to the edges of a vertical connective, and dehiscing by two longitudinal clefts.<sup>1</sup> There is no trace of a

*Excavaria* (*Sapium*) *Laurocerasus*.



Fig. 210. Young male bud (♂).

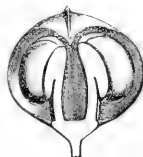


Fig. 211. Long. sect. of male bud.

gynæceum, as in the female flower we see no trace of the male organ. The gynæceum alone is found within the sepals, formed of an ovary with three cells alternating with them, and surmounted by a

*Excavaria* (*Adenopeltis*)  
*Colliguaya*.



Fig. 212. Inflorescence (♂). Fig. 213. Male flower.

style whose three revolute branches are charged within with stigmatic papillæ. In the inner angle of each cell is inserted a descendent anatropous ovule, with exterior and superior micropyle, capped by an obturator. The fruit is capsular, dehiscing in three bi-valve and monospermous shells; and the exarillate seed contains under its coats an abundant fleshy albumen at the centre of which is an embryo with foliaceous cotyledons much larger than the superior cylindrical radicle.

In certain species of *Excavaria*, such as *E. Lastellei*,<sup>2</sup> the number of stamens may be as many as


seven or eight, all the other characters remaining the same.

In those distinguished under the name of *Maprounea*<sup>3</sup> (fig. 207-209), the two stamens have their filaments united to a great height in a long column, and the common part of

<sup>1</sup> The pollen there, where it is known, is that of the *Euphorbiaceæ* in general, almost spherical or ovoid, with bands or folds generally three in number.

<sup>2</sup> *Anomosachys* H. Bn. *Euphorb.* 525.

<sup>3</sup> AUBL. *Guian.* 895, t. 342.—J. *Gen.* 391.—A. Juss. *Euphorb.* 54, t. 17.—A. S. H. *Pl. Us. Bras.* t. 65.—ENDL. *Gen.* n. 5769.—M. ARG. *Prodr.* 1190.—*Egopricon* L. *Suppl.* 413.

the style is also much more elongated. In others, the lines of dehiscence in the anthers are short enough to have been described as pores.<sup>1</sup> In the species of which the type of the genus *Conosapium* has been made,<sup>2</sup> the free part of the stamens is very short and has for a common support a conical pro-  
*Eræccaria (Dactylostemon)*  
*Klotzschii.*  
  
 Fig. 214. Male flowers (♂).

longation of the receptacle. In *Adenopeltis*<sup>3</sup> (fig. 212, 213), *Gymnostillingia*,<sup>4</sup> *Gymnanthes*,<sup>5</sup> *Dactylostemon*,<sup>6</sup> etc., of which distinct genera have also been made, the sepals of the calyx in the male and female flowers may be reduced to very small dimensions, being represented by very tiny cut leaves (fig. 213, 214), or even disappearing altogether. The receptacle supporting them has simply the form of a surbased cone, or as in *Stillingia*,<sup>7</sup> *Gymnostillingia*, and *Adenopeltis*, it is dilated into a triangular platform, the horns corresponding to the shells of the fruit it supports. In this case the cells are separated below by a short columella, while in *Maprounea* this remains rudimentary.<sup>8</sup> As to *Dactylostemon*, not only are they remarkable for the little development of the calyx, but also the number of stamens in each flower may be as many as

<sup>1</sup> For example, in *Elachocroton* F. MUELL. in *Hook. Journ.* (1857), 17.

<sup>2</sup> M. ARG. in *Linnaea*, xxxiii. 87; *Prodr.* 1154.

<sup>3</sup> BERT. ex A. JUSS. in *Ann. Sc. Nat. sér. I.* xxv. 24.—ENDL. *Gen. n.* 5770.—C. GAY, *Fl. Chil.* v. 337.—H. BN. *Euphorb.* 532, t. 7, fig. 15-19.—M. ARG. *Prodr.* 1164.

<sup>4</sup> M. ARG. in *Linnaea*, xxxii. 89; *Prodr.* 1163.—H. BN. in *Adansonia*, v. 339; xi. 121.

<sup>5</sup> KL. in *Ericks. Arch.* vii. (1841), 181; in *Hook. Journ.* ii. 44.—ENDL. *Gen. Suppl.* ii. 87.—M. ARG. in *Linnaea*, xxxii. 84; *Prodr.* 1195.—*Gymnarrhæa* LEANDR. ex KL. loc. cit.—*Aetnostemon* KL. in *Ericks. Arch.* (1841), 180.—ENDL. *Gen. Suppl.* ii. 88.—M. ARG. in *Linnaea*, xxxii. 84; *Prodr.* 1192.—H. BN. *Euphorb.* 532; in *Adansonia*, v. 342; xi. 122.

<sup>6</sup> SW. *Prodr.* 6 (1783).—KL. in *Ericks. Arch.* vii. 182.—H. BN. *Euphorb.* 530; in *Adansonia*, xi. 121.—*Eræccaria* A. JUSS. *Euphorb.* t. 16, fig. 55.—*Sebastiania* SPRENG. *N. Entd.* ii. 118, t. 3 (1821).—*Gussonia* SPRENG. loc. cit. 119, t. 2, fig. 7-10.—*Adenogyne* KL. loc. cit. 183 (part.).—*Cnemidostachys* MART. *Reis.* 206; *Nov. Gen. et*

*Spec. i.* 70, t. 40-44.—*Ditrysinia* RAFIN. *Neog.* 2 (1825).—*Microstachys* A. JUSS. *Euphorb.* 48, t. 15.—*Savothrostachys* KL. loc. cit. 185.—*Clonostachys* KL. loc. cit.—*Elachocroton* F. MUELL. in *Hook. Journ.* (1857), 17.—*Fragiopsis* KARST. in *Koch. Wochenschr.* (1859), 5.

<sup>7</sup> GARDEN, in *L. Mantiss.* i. (1767).—J. *Gen.* 390.—POIR. *Diet.* vii. 446.—NECK, *Elem.* ii. 340.—ENDL. *Gen. n.* 5780.—H. BN. *Euphorbiac.* 610; in *Adansonia*, v. 340.—M. ARG. in *Linnaea*, xxxii. 84; *Prodr.* 1155.

<sup>8</sup> The columella is most developed and persists with a pericarp capsular or more or less fleshy, in various species of *Sapium* (JACQ. *Stirp. Sel. Amer.* 249, t. 151 (1763).—ENDL. *Gen. n.* 5780.—KL. in *Ericks. Arch.* vii. 187.—M. ARG. *Prodr.* 1202.—*Commia* LOUR. *Fl. Cochinch.* 605, 742.—*Triadica* LOUR. op. cit. 748.—*Sclerocroton* HOCHST. in *Flora* (1845), 85.—*Spirostachys* SOND. in *Linnaea*, xxxii. 106.—*Falconeria* ROYL. *Ill. Himal.* 354, t. 84.—*Gymnobotrys* WALL. ex H. BN. *Euphorbiac.* 526.—*Bonania* A. RICH. *Fl. Cub.* 201, t. 68.—*Stillingifletia* BOJ. *Hort. Maur.* 248.—*Sapiopsis* M. ARG. in *Linnaea*, xxxii. 84).

fifteen.<sup>1</sup> The gynæceum presents a smaller number of variations. The style-branches, generally cylindrical, may become flattened as in *Conosapium* and *Teniosapium*; <sup>2</sup> characters which have been judged sufficient to distinguish genera, but to which we do not accord the same value. It is the same as to the height to which the style, single at first, afterwards separates into two or three stigmatiferous branches, always entire or more or less recurved and revolute. In *Adenopeltis* (fig. 212) the division takes place almost at the summit of the ovary. The seeds, with or without an arillate dilatation of the micropyle or of the whole extent of their surface, being in general completely anatropous, so that, although the chalaza is quite inferior, this organ may in *Dactylostemon* rise more or less upon the inner edge, variations which seem to us quite insufficient to constitute distinct genera. Thus composed, this genus contains about a hundred and twenty-five species.<sup>3</sup> These are trees, shrubs, or even suffrutescent or herbaceous plants; they are met with in all warm regions, especially in America. They have alternate, rarely opposite stipulate or exstipulate leaves. The simple penninerved limb often bears two lateral glands at the base; it is the same with the bracts, bractlets, and sometimes even the sepals. These glands are, moreover, very variable in form, more or less hollowed in cups, sacs, or tubes, sessile or stipitate and claviform. The flowers are disposed in racemes or spikes generally terminal, loaded with bracts whose axil contains a flower or a cyme, often three-flowered. In the monœcious species the female flowers occupy the axils of one or several inferior bracts of the inflorescence, and the male flowers, much more numerous, occupy the summit,

Close beside *Excæcaria*, we place: *Senefeldera*, consisting of trees from Brazil, generally with from six to eight stamens, bi-seriate, borne upon a conical receptacle, an obovoid trilobed imbricated male calyx, and a capsular fruit with arillate seeds; *Pachystroma*, also a Brazilian tree, is also nearly allied to *Excæcaria*, which has a calyx

<sup>1</sup> Besides this, in certain species, a true many-flowered glomerule has sometimes been described as a single flower.

<sup>2</sup> M. ARG. *Prodr.* 1200.—H. BN. in *Adansonia*, ii. 31, (*Stillingia*).

<sup>3</sup> M. ARG. *Prodr.* 1154 (*Conosapium*), 1155 (*Stillingia*), 1163 (*Gymnostillingia*), 1164 (*Aden-*

*nopeltis*, *Sebastiania*), 1190 (*Maprounea*), 1192 (*Actinostemon*), 1195 (*Dactylostemon*), 1201 *Teniosapium*, *Excæcaria*.—BENTH. *Fl. Austral.* vi. 151 (*Sebastiania*), 152; *Fl. Hongkong*, 302 (*Stillingia*).—H. BN. in *Adansonia*, 77, 285, 350; ii. 27, 227; iii. 162; v. 320; vi. 323 (*Stillingia*).

valvate or nearly so, with three erect and elongated stamens, the base of the fruit being dilated into a triangular mass like that of *Stillingia*; *Manchineel* (*Hippomane*), a tree of central South America, having the male diandrous flowers of *Excavaria*, only distinguished by a drupaceous fruit with hard rugose and plurilocular stone; *Carumbium*, with the habit of *Excavaria*, having two large imbricated sepals to the flower, equal or unequal, more or less thickened and glandular below, outside or inside, one or more circles of stamens, central or nearly so, folded in two halves, applied against each other, and a dry or fleshy fruit; they belong to the warm regions of Asia and Oceania. *Omphalea*, with the general characters of the preceding genera, has a calyx with four or five divisions, and an androceum whose three or four anthers are inserted on the edge of a dilatation in the form of a disk or mushroom surmounting a short central column. *Hura* (Fr., Sablier) has a cup-shaped calyx and an androceum whose central

*Hura crepitans.*

Fig. 215. Androceum (?).

*Hura crepitans.*

Fig. 216. Female flower.

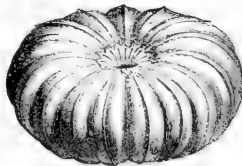
Fig. 218. Fruit ( $\frac{1}{2}$ ).

Fig. 217. Long. sect. of female flower.

column supports sessile, extrorse anthers disposed on two or several verticils (fig. 215.) The gynæceum is surrounded by a large style, dilating into a head resembling a corolla, fleshy, with numerous thick or reflexed divisions (fig. 216, 217). The fruit (fig. 218), plurilocular like the ovary, is a depressed capsule whose shells separate and open elastically with some noise.

In a small peculiar sub-series, which has received the name of *Anthostemideæ*, the flowers are monandrous, the gynæceum remaining nearly that of *Excæcaria*. In *Ophthalmoblapton*, a Brazilian tree, with the foliage of *Excæcaria*, the anther is bilocular and issues by a kind of perforation of the summit of an urceolate calyx, and the dilated summit of the style is pierced by a triangular pore leading into a stigmatiferous cavity. In *Tetraplandra*, also a native of

*Anthostema senegalense*.



Fig. 219. Inflorescence, with general involucre ( $\frac{2}{3}$ )

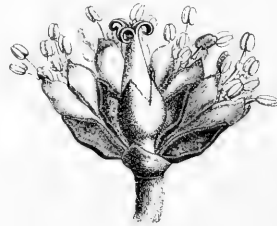


Fig. 220. Inflorescence, without the large inferior bracts.

Brazil, the terminal anther is quadrilocular (unless it is considered as formed by the bringing together of two bilocular anthers at the summit of the common and articulated column), the style having three distinct branches. *Algernonia*, a tree of the same country, has but one anther with two non-articulate cells. Its male calyx is 3–5-lobed and its denticulate glandular female calyx has three divisions. *Dalembertia*, inhabiting Mexico, has no male calyx; the bilocular anther is supported by a filament, at first incurved, bearing on its convexity a bracteole superposed to the axile bract. Finally, *Anthostema* (fig. 219, 220), wrongly united with *Euphorbia* and *Dalechampia* in one and the same tribe, has the monandrous flowers of the preceding genera, accompanied by glandular bracts like those of *Excæcaria* generally, and united in little clusters round a female flower which finally becomes lateral. The flowers of both sexes have a small calyx in the three known species of the genus, natives of Western tropical Africa and Madagascar.

## VI. DICHAPETALUM SERIES.

*Dichapetalum*<sup>1</sup> (figs. 221–225), long designated under the name of *Chailletia*, and of which a distinct family has been made, because the flowers are often hermaphrodite, must be considered as the highest in organisation of the *Euphorbiaceæ* with biovulate ovary cells. They are sometimes polygamous. In those flowers which combine both sexes a receptacle is seen (frequently convex), bearing a double perianth, an isostemonous androceum and a superior gynæceum. The calyx is formed of five unequal sepals, free or united below, quineuncially imbricated, larger and more membranous, as they are more interior in præfloration, and the corolla, of five alternate petals, more or less deeply divided above into two spoon- or hood-shaped lobes, slightly imbricated or induplicate in the bud. The androceum is formed of five stamens, alternate with the petals, and with a like number of hypogynous glands, free or united, usually bifid. Each stamen is composed of an hypogynous filament and an anther, the two introrse cells of which, dehiscing longitudinally, are applied on the internal surface of a thick, glandular, coloured connective. The gynæceum is composed of an ovary with two or three cells, surmounted by a style divided

*Dichapetalum (Chailletia) toxicarium.*

Fig. 221. Floriferous branch.

<sup>1</sup> DUP.-TH. *Nov. Gen. et Spec.* 78 (1806).—H. BN. in *Adansonia*, xi. 102, t. 9, fig. 7–9.—*Leucosia* DUP.-TH. *op. cit.* 79.—*Symphyllanthus* VAHL, in *Naturist. Selsk.* vi. 86 (1810).—*Chailletia* DC. in *Ann. Mus.* xvii. (1811), 153, t. 1, fig. 1; *Prodr.* ii. 57.—TURP. in *Dict. Sc. Nat. Atl.* t. 247.—ENDL. *Gen.* n. 5758.—B. H. *Gen.* 341, n. 1.—H. BN. in *Payer Fam. Nat.*

307.—*Moacurra* ROXB. *Fl. Ind.* ii. 69.—H. BN. *Et. Gen. Euphorbiac.* 587.—M. ARG. in *DC. Prodr.* xv. p. ii. 227.—? *Quilesia* BLANCO, *Fl. de Philipp.* 176.—*Mestotes* SOLAND. MSS (ex. R. BR. Congo, 442).—*Wathenbergia* R. BR. in *Wall. Cat.* n. 4332 (nec BL. nec SCHRAD. nec SCHUM.).—*Plappertia* REICHB. *Consp.* n. 3824 (ex ENDL.).

above, for a very variable distance, into two or three stigmatiferous branches. In the internal angle of each cell are inserted two collateral descendent ovules, with a superior and exterior micropyle,

*Dichapetalum pedunculatum.*



Fig. 222. Young gynoecium and disk ( $\frac{1}{2}$ ).



Fig. 223. Longitudinal section of flower.

capped at the top by an obturator sometimes little developed or wanting. The fruit is dry, imperfectly dehiscent or indehiscent, with one, two or three cells, usually monospermous. The seeds contain under their coats a large exalbuminous embryo, with a short superior cylindrical-conical radicle.

In certain African species of *Dichapetalum* such as *D. Heudelotii* (fig. 224), the floral receptacle, instead of being convex, is hollowed into a shallow cup, on the edges of

which are inserted the perianth and the androecium, nearly on a level with the middle of the height of the ovary, which occupies the centre of the receptacular cup. In other species from the same

*Dichapetalum Heudelotii.*



Fig. 224. Longitudinal section of flower ( $\frac{1}{2}$ ).

country, as *D. hispidum* (fig. 225), the depth of this cup becomes so considerable that the entire ovary is plunged in the cavity and it is on the edge of the receptacle, much higher than the summit of the ovary, that the perianth, androecium, and glands of the disk are inserted. This genus then, as actually constituted, includes at the same time plants with hypogynous, perigynous, and epigynous insertions. The species constituting it, some thirty in number,<sup>1</sup> inhabit all tropical regions of Ame-

rica, Africa, Asia, and Oceania. They all have simple alternate leaves, accompanied by two caducous stipules, and axillary flowers, disposed in more or less ramified clusters of cymes. In most cases the peduncle of the inflorescence is drawn up and connate for a variable length with the petiole of the axile leaf.

<sup>1</sup> Hook *Icon.* t. 791, 592 (*Chaillatia*).—KL. in *Pet. Moss. Reis. Bot.* t. 19, 20.—TUL. in *Ann. Sc. Nat.* sér. 3, vii. 83.—Miq. *Fl. Ind.-Bat.* Suppl. -

i. 328.—OLIV. *Fl. trop. Afr.* 1, 339 (*Chaillatia*).—WALP. *Rep.* ii. 829; *Ann.* i. 898; ii. 279; iv. 441 (*Chaillatia*).



Close beside *Dichapetalum* are placed two genera very closely allied to it: *Stephanopodium*<sup>1</sup> (fig. 226), distinguished principally by the petals being united, sometimes for a very great distance in a gamopetalous corolla bearing the stamens; and *Tapura*<sup>2</sup> (fig. 227–229), also having a gamopetalous corolla, but irregular, imbricated and with fertile stamens, generally fewer, more rarely equal in number to the divisions of the corolla.<sup>3</sup> The disk is unilateral. The two last genera have alternate leaves, and the flowers in glomerules, drawn up as far as the summit of the petiole. The first has only American species,

*Dichapetalum hispidum.*Fig. 225. Longitudinal section of flower ( $\frac{2}{3}$ ).*Stephanopodium Engleri.*Fig. 226. Longitudinal section of flower ( $\frac{1}{2}$ ).Fig. 227. Flower ( $\frac{1}{2}$ )*Tapura guianensis.*

Fig. 228. Diagram.



Fig. 229. Longitudinal section of flower.

at present four in number;<sup>4</sup> the latter is represented by a species

<sup>1</sup> Poepp. et Endl. *Nov. Gen. et Spec.* iii. 40. t. 246.—B. H. *Gen.* 341, n. 2.—H. Bn. in *Payer Fam. Nat.* 308.

<sup>2</sup> Aubl. *Guian.* 126, t. 48.—J. *Gen.* 419.—Poir. *Suppl.* vii. 587; *Ill.* t. 122.—DC. *Prodr.* ii. 58.—Endl. *Gen.* n. 5759.—B. H. *Gen.* 341, 995, n. 3.—H. Bn. in *Payer Fam. Nat.* 308; in *Adansonia*, xi. 110.—Rohria Schreb. *Gen.* 30 (nec Vahl).

<sup>3</sup> This has only been seen at present in one American species, *T. capitulifera*, the type of our

section *Dischizolana*. The meiotemonous species have usually three fertile stamens, alternate with the two large double-headed petals; the others are sterile. The plane of symmetry passing by the middle of sepal 2 and in the intervals of sepals 1 and 3, cuts at an angle of  $1/10$ th of the circumference the plane of symmetry of the corolla (fig. 228), the androecium and the gynæceum. (See *Adansonia*, xi. 111, 112).

<sup>4</sup> Walp. *Rep.* ii. 828; v. 408.—H. Bn. in *Adansonia*, xi. 109, t. 9.

in tropical Western Africa; the others, seven or eight in number,<sup>1</sup> inhabit the whole of tropical America.

## VII. PHYLLANTHUS SERIES.

*Phyllanthus*, the best known genus of this series, is not the most complete type. This is found to be represented by other plants, such, for instance, as *Wichandia elegans*<sup>2</sup> (fig. 230–233), a shrub from the Seychelles and neighbouring isles, which has monœcious

*Wichandia elegans.*

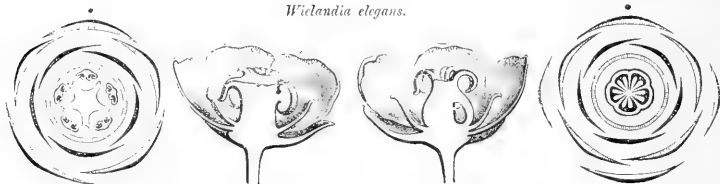


Fig. 230. Male flower, diagram.

Fig. 231. Male flower, longitudinal section ( $\frac{1}{2}$ ).

Fig. 232. Female flower, longitudinal section.

Fig. 233. Female flower, diagram.

flowers, with a convex receptacle. It bears a calyx of five sepals, slightly united at the base, arranged in quincuncial præfloration in the bud, and a corolla of five free, imbricated, alternate petals. Farther in is found a cupular disk, with five but slightly prominent<sup>3</sup> alternipetalous angles. The receptacle afterwards rises in a thick central column which supports five alternipetalous stamens, whose nearly sessile anthers are introrse in the bud, afterwards reflexed outwardly at anthesis, and have two cells deshiscent by longitudinal clefts. The column is terminated by a body with five oppositipetalous branches, representing the divisions of a rudimentary gynæceum. In the female flowers, within the perianth and disk, similar to those of the male flower, is seen a fertile gynæceum, the ovary having five cells superposed to the petals and surmounted by a style with five stigmatiferous, bi-lobed, reflexed branches. In the

<sup>1</sup> Poepp. et Endl. *Nor. Gen. et Spec.* iii. t. 246, fig. 2.—Oliv. *Fl. trop. Afr.* i. 344.—H. Bn. in *Adansonia*, xi. 111, note.—Walp. *Rep.* i. 549; ii. 829; v. 408; *Ann.* iv. 442.

<sup>2</sup> H. Bn. *Euphorbiac.* 568, t. 22, fig. 6–10; in *Adansonia*, ii. 32.—*Savia elegans* M. Arg. in *Linnaea*, xxxii. 78; *Prodr.* 228.

<sup>3</sup> Sometimes hardly distinct.

inner angle of each cell are inserted two collateral, descendent ovules, with an exterior and superior micropyle, capped by a well-developed obturator. This plant has simple, petiolate, alternate leaves, accompanied by two stipules, and flowers borne by small axillary branches, whose bracts or alternate leaves have small cymes in their axils. The pedicels of the female flowers are less numerous, longer, thicker, and more swollen at their summit than those of the male.

*Savia* consists of closely allied plants distinguished especially by a trimerous gynæceum. Their flowers have five or a less number of petals, and a disk with five or six lobes, sometimes petaloid. The fruit is capsular, and the seeds contain, in a fleshy albumen, an embryo with flat or slightly sinuous cotyledons. They are bushes from the Antilles and eastern islands of Africa. We might, strictly, separate *Actephila*, consisting of shrubs from the warmer regions of Asia and Oceania, which, with the same floral organisation, have a more or less cup-shaped receptacle, and seeds whose embryo destitute of albumen, or only presenting between its folds a small quantity, have involute-folded cotyledons, enveloping each other, and thus sometimes forming in the Australian species, where they are membranous, a number of spiral turns. *Discoarpus*, from tropical America, is analogous to these plants; it has nearly the same flower, and cotyledons which also envelop one another, but the seeds are provided with a membranous aril. The sepals are imbricate or partly valvate; the corolla and androecium are often incomplete, and the gynæceum, like that of *Actephila*, is usually surrounded by a variable number of staminodes. This genus may be considered as the connection between *Actephila* and *Amanoa*. These were formally reduced to some American and African species, with a slightly concave receptacle, on the edges of which are inserted a calyx and small, slightly perigynous, petals; the sepals more or less imbricated, but with thick edges, cut straight, and, in consequence, sometimes quite valvate. The fruit was usually capsular, but often also more or less fleshy at maturity, dehiscing incompletely or with difficulty. We have attached to this group a large number of species from all the warm countries of the old world, formerly referred to other genera, and which differed from the foregoing, in having their calyx always and completely valvate; the receptacle becomes hollower; the perigynous nature of their petals and glands much more decided,

while the central part of the receptacle which supports the stamens becomes more drawn out; the pericarp is either distinctly dehiscent or completely indehiscent; finally, the embryo has flat or crumpled cotyledons, frequently becoming thinner and thinner, and surrounding themselves in consequence with more or less considerable albumen.

The form of the receptacle is modified in *Andrachne*, remaining, however, in general, slightly concave; it is a sort of small shallow disk, on the edges of which are inserted the sepals and the petals, sometimes wanting or very small. The glands of the disk are oppo-

*Poranthera ericoides.*



Fig. 234. Male flower (♂).



Fig. 235. Longitudinal section of male flower.

site the petals and not the sepals, and the anthers are introrse. The seeds are albuminous. In other respects the small group of *Andrachneæ* is very analogous to the sub-series *Amanoæ*; it includes many under-shrubs growing in both worlds, especially in the temperate regions. The *Porantheras* (fig. 234, 235), all natives of Australia, have the same floral symmetry as *Andrachne*; but their linear leaves are ericoid, and, in consequence, the cotyledons are narrow and thick, instead of being membranous. The anthers, with four small cells, open above by four short clefts whose separated edge encircles a sort of oval pore.

*Lachnostylis*, consisting of shrubs from the Cape, approaches nearer *Andrachne* by its foliage, having the aspect of *Myrica*, and its alternipetalous stamens, borne on a central column, like those of most *Amanoas*. The *Pagerias*, trees from the eastern islands of Southern Africa, with alternate or opposite leaves, have also pentamerous flowers, provided with petals; but the female calyx has the form of a sac with very short teeth, which seem valvate; and the ovary, surmounted by a style in form of an entire column, has five cells superposed to these teeth.

The petals disappear in *Caletia* (fig. 236–239), the type of a particular sub-series of which the genera, all Australian, have the ericoid foliage and narrow cotyledons of *Poranthera*, but the petaloid calyx is constructed on the repeated ternary type, the same as the androecium

*Caletia micranthemoides*.



Fig. 236. Floriferous branch.



Fig. 237. Male flower ( $\frac{1}{2}$ ).



Fig. 238. Female flower.



Fig. 239. Female flower,  
longitudinal section.

whose divisions are superposed to the sepals. *Micranthemum*, closely allied, has, with the same aspect, but three stamens superposed to the exterior sepals; and the lobes of the rudimentary gynæceum are superposed to the interior sepals, instead of alternating with them, as in *Caletia*.<sup>1</sup> *Pseudanthus* (fig. 240–241) differs from the preceding genera in having the stamens, instead of encircling a central rudiment of a pistil, inserted on an axile column from which are detached the filaments surmounted by the two separated cells of the anthers; these are definite or indefinite in number. The latter is always the

<sup>1</sup> Notwithstanding the difference of aspect and foliage (and the fact seems to show the slight value of these characters), I must place here the *Choriceras*, Australian shrubs, which have quite the male flower of *Caletia*, with two verticils of dissimilar sepals, and stamens 5–7

in number, inserted beneath a central rudiment of the gynæceum, but the opposite leaves, however, are flattened and not ericoid, and the carpels, each tapering in a distinct style, are independent in the fruit for nearly half of their height.

case with *Stachystemon*, whose androceum is formed of a great number of anthers, sessile on a lengthened column, representing in fact a sort of spike.

*Securinea*, also without petals, has pentamerous flowers, an imbricated calyx, with an equal number of superposed stamens, inserted

round a central body, so that it might be described as consisting of apetalous species of *Wielandia*. The seeds are albuminous, and the leaves flat and enlarged. They are trees and shrubs from the warm and temperate regions of both worlds, even of Europe. The fruit, with two or three cells, is capsular and dehiscent, or indehiscent and sometimes even completely fleshy.

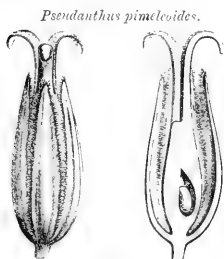


Fig. 240. Female flower (♀).

Fig. 241. Female flower, longitudinal section.

*Antidesma* (fig. 242-243), originally forming a distinct family, is very closely allied to *Securinea*. The fruit, more often indehiscent than dehiscent, has from one to three cells; but it is easily distinguished by a character otherwise of little importance in itself: it has the anther cells in a wallet, at first pendant, then erect after anthesis. *Antidesma*

has been observed in all warm regions of the globe. Beside this and *Securinea* are also placed: *Aporosa*, which, under the name of *Scepa*, was also considered to constitute a separate order, having the male flowers arranged in catkins, with anthers whose cells are longitudinally adnate. The androceum, inserted round a central body, often small or even wanting, is usually formed of two divisions, like the gynæceum: the

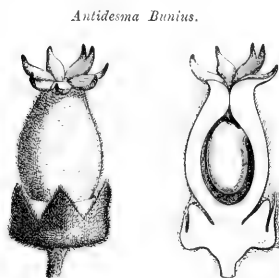


Fig. 242. Female flower (♀).

Fig. 243. Female flower, longitudinal section.

fruit is capsular. It inhabits the tropical regions of Asia and Oceania. *Cometia*, formed of shrubs from Madagascar (which ought perhaps to be included in the preceding genus), has also catkins with 3-5-androus flowers, and a uni-carpellary gynæceum; the fruit is fleshy. The *Richerias*, American plants, with capsular fruit,

diœcious, 3-5-merous flowers, the males disposed in spikes of glomerules, the females in spikes provided with an hypogynous urceolate disk.<sup>1</sup> *Hymenocardia*, from tropical Asia and Africa, having male flowers in simple spikes, a calyx with valvate or but slightly imbricated divisions, and a bilocular fruit, surmounted by two large wings, which correspond to the backs of the cells, and form a samara. *Baccaurea*, which grows in tropical Africa, Asia, and Oceania, has an indehiscent fruit, the seeds provided with a fleshy aril; the androceum is isostemonous, or diplostemonous, with a verticil of stamens, one or more of which may be deduplicate. *Uapaca*, inhabiting continental and insular tropical Africa, having male flowers analogous to those of *Securinega* and *Baccaurea*, isostemonous, all collected, at the summit of a common peduncle, in a ball enveloped by a calyciform involucre; the fruit is trimerous, fleshy or suberous. *Bischoffia*, composed of trees from tropical Asia and Oceania, with male flowers very analogous to *Hymenocardia*, but collected in very ramified clusters, without disk, an indehiscent fruit, almost entirely fleshy, distinguished above all by its compound-trifoliolate leaves, analogous to those of certain *Araliaceæ* and *Terebinthaceæ*. The *Piranheas*, natives of Brazil, also with trifoliolate leaves, but an indefinite number of stamens in the male flower, replaced in the female flower by some hypogynous tongues, the rudimentary gynœceum represented by a rather large number of glandular lobes, extending to the space at the foot of the stamens. *Freireodendron*, a Brazilian tree, having, it is said, the stamens inserted round a central disk-shaped body, the exterior five superposed to the sepals, and whose drupaceous fruit is, like the ovary, unilocular. *Drypetes*, whose ovary has one, two or three cells, like *Antidesma*, and whose fruit always becomes indehiscent. The stamens are sometimes definite and sometimes indefinite in number, and inserted round a central body of variable dimensions, described sometimes as a disk and sometimes as a rudimentary gynœceum. They belong to all tropical countries.

The *Putranjivas* (fig. 244-247) are referred to another tribe and

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<sup>1</sup> We are unable to definitely fix the place of the *Dissiliarias*, whose female flower is alone known, but whose fruit nearly resembles that of the *Richerias*, tri- and tetracoccous, with opposite leaves, which gives them the appearance of certain *Baloghia* (*Codiaeum*), a

large imbricated foliaceous calyx, and a continuous cupula-shaped disk, surrounding the base of the ovary. The two species at present known are Australian. Their leaves are generally opposite.

have even been a distinct family ; but they affect the closest affinity with *Drypetes*. They have the aspect, foliage, fruit, and often the female flower of it ; but their stamens, two or three in number, free or diadelphous, are inserted at the centre of the flower, and not around

*Putranjiva Roxburghii.*

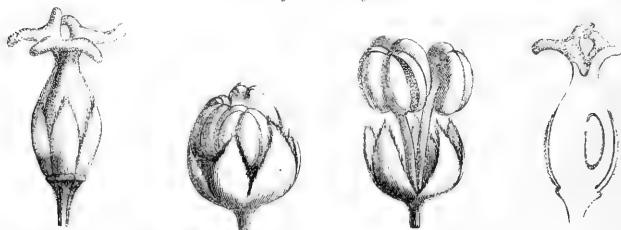


Fig. 246. Gynæceum (♂)

Fig. 244. Male bud ♀.

Fig. 245. Expanded male flower.

Fig. 247. Longitudinal section of gynæceum.

a rudiment of the gynæceum ; characters in short which belong, properly speaking, to all the *Phyllanthææ*. The known species are Indian. *Longetia*, which inhabits New Caledonia, is distinguished from the preceding genera by its style branches, instead of occupying the summit of the ovary, being thrown back towards its periphery ; in this respect, it is analogous to *Bernardia* among the uniovulate genera. The first known species had numerous stamens. In a second species they are occasionally nearly definite. In this genus, the presence of a central body is not constant ; but it is sometimes observed. The leaves are opposite. In the species of *Burcavia*, from the same country, the leaves are also opposite ; the stamens are numerous, the gynæceum is tri- or tetramerous, with a central style ; and the capsular fruit encloses seeds provided with a laciniate and coloured aril, proceeding at the same time from the micropyle, the hilum, and even the remains of the obturator. The *Petalostigmas*, Australian shrubs, are characterised, not only by the development in fleshy blades of their style branches, but also by the numerous central stamens, and fruits in part fleshy, though dehiscent, in which each cell is divided by a false partition into two monospermous compartments. *Hyænanche*, an abnormal genus from Southern Africa, has male flowers, with sepals in very variable number, like the stamens, inserted round the empty centre of the irregular receptacle. The fruit with three



or four shells, is capsular, with a suberous mesocarp. The leaves are opposite or verticillate. In the species of *Daphniphyllum*, trees and shrubs from the warm regions of Asia, Oceania, and Africa, doubtfully ascribed to this family, the stamens are inserted close to the centre of the flower, where, in an indefinite number, they form an umbelliform verticil. Their fruit is fleshy and indehiscent, and the seed encloses an embryo shorter than is usual in the *Euphorbiaceæ*.

The species of *Phyllanthus* (fig. 248-253), which give their name to this series constitute the oldest and most completely studied genus. Formerly nearly the whole of the biovular *Euphorbiaceæ* observed in tropical countries were ascribed to it. The flowers, generally monœcious, more rarely dicecious, and always small in size, have usually only three stamens, more rarely four or five, and but very rarely a larger number, always with central insertion. The perianth has generally from four to six imbricated sepals, with a like number of alternate glands. The fruit is capsular, rarely more or less fleshy, with ex-carunculate seeds, anatropous or descendent, or sometimes almost completely orthotropous and ascendent, but always directing their micropyle, which in the ovule was capped by a cellular obturator, towards the organic summit of the cell. The

exterior seminal coat may be thickened for the whole of its length. Nothing is so variable as the organization of the androceum, the extrorse anthers having the base directed downwards, and the filaments being in certain cases completely free (fig. 251). They may be short, oblique, or nearly transverse, or well straightened, elon-

*Phyllanthus (Xylophylla) angustifolius.*



Fig. 248. Floriferous branch. Fig. 250. Female flower (½).



Fig. 249. Male flower.



gated, more or less united to a vertical column (fig. 252), or again completely monadelphous, inserted on the edges of a connective more or less triangular (fig. 249), and with a transverse direction, sometimes even confluent at the time of dehiscence in a sort of horizontal ring (fig. 253). The numerous species of this genus are herbs, shrubs, and even trees which grow in the warm and temperate regions of the entire globe. Generally their leaves are alternidistichous, simulating, on the branch which bears them, the arrangement of the folioles of a pinnate leaf. Sometimes they are reduced to simple scales, and, in this case, the branches on which they are

*Phyllanthus Niruri.*Fig. 251. Male flower ( $\frac{1}{3}$ ).*Phyllanthus Fagueti.*Fig. 252. Male flower ( $\frac{1}{3}$ ).*Phyllanthus cyclanthera.*Fig. 253. Male flower ( $\frac{1}{3}$ ).

inserted are dilated into flattened cladodes; this happens in the species of the section *Xylophyllu* (fig. 248). The *Breynias*, belonging to the warm parts of Asia and Oceania, have the vegetative organs of the foliaceous species of *Phyllanthus*. They are distinguished by flowers with oboconical male perianth, the divisions being appendiculate-folded on the back and infracto-connivent. The seeds are provided with a partial or generalized aril. *Sauropus*, from the same countries, has a turbinate depressed male calyx, with an adnate disk, 6-lobed, the glands superposed to the sepals, instead of being alternate as in *Phyllanthus*, of which *Sauropus* has otherwise the general organization and mode of vegetation. *Aggyneia*, also closely allied, has the glands situated like those of *Sauropus*, the disk in the male flower being long adnate inwardly, free and lobed outwardly; the contrary to what is observed in *Sauropus*. The only known *Aggyneia*, a herb in all points very analogous to *Phyllanthus* in foliage and inflorescence, inhabits the tropical regions of the old world.

## VIII? CALLITRICHE SERIES.

*Callitriche*<sup>1</sup> (fig. 254–258), which has been considered, not without question, as a lessened aquatic type of biovulate Euphorbiaceæ, has hermaphrodite or more frequently monœcious or diœcious, dimorous apetalous flowers. The male flower has two lateral imbricated

*Callitriche stagnalis.*



Fig. 257. Fruit (♂). Fig. 255. Male flower (♂). Fig. 254. Floriferous branch. Fig. 256. Female flower (♀). Fig. 258. Long. sect. of fruit.

sepals,<sup>2</sup> and two alternate stamens inserted upon a small convex receptacle or even only one middle stamen. The filaments are free, erect, exserted at anthesis; the anthers are reniform, dehiscing by a semi-circular lateral cleft<sup>3</sup>. In the female flower the perianth, sometimes but little developed, is similar to that of the male flower, and the gynæceum is composed of a free ovary,<sup>4</sup> with four cells superposed to the sepals, each divided into two half cells by a false centripetal partition, surmounted by a style soon divided into two simple, straight lateral branches, stigmatiferous on their whole surface. In each cell is found two collateral, descendent, anatropous ovules, with micropyle directed upwards and outwards, the exostome thickened and often surmounted by a small cellular obturator. In the hermaphrodite flowers there is an ovary with two cells superposed to the sepals, and one or two alternate stamens. The fruit is capsular, with two rather thin shells, each divided into half shells, marginate or winged at the back by deduplication of the false partition. In each half shell is found a descendent seed with an

<sup>1</sup> *Gen.* n. 13.—ADANS. *Fam. des Pl.* ii. 471.—J. *Gén.* 19.—LAMK. *Dict.* i. 564; Suppl. ii. 36.—GÆRTN. *Fruct.* i. 330, t. 68—DC. *Prodr.* iii. 70.—NEES, *Gen.* ii. 4.—ENDL. *Gen.* n. 1830.—H. BN. in *Bull. Soc. Bot. de Fr.* v. 337; *Euphorbiac.* 650, t. 21. fig. 28–33.—CLARKE in *Trans. Linn. Soc.* xxii. 411; in *Scem. Journ. of Bot.* (1865), 36.—HEGELM.

*Monogr. der Gatt. Callitriche.* Stuttg. (1864).—B. H. *Gen.* 676, n. 9.

<sup>2</sup> Botanists who consider the flowers naked call these bracts.

<sup>3</sup> There are certainly two cells, the clefts being confluent at the summit.

<sup>4</sup> It has been supposed "adherent," with a calyx having an abortive limb.

exostomic caruncle, with fleshy albumen, surrounding an axile cylindrical embryo, straight or arched, with superior radicle. *Callitriche* consists of delicate annual shrubs, with stems often floating. The leaves are opposite, small, entire, three-nerved; the flowers are axillary, generally solitary. Some dozen species<sup>1</sup> have been described, which perhaps ought to be reduced to one or two. These are found in all hot and temperate climates.

This large family which we reduce, as will be seen, to a hundred and fifty genera besides a tolerable number ill-known and doubtful ones,<sup>2</sup> was long ago recognized by classifiers. In 1592, ZALUZIAN, in his *Methodus*, already indicated a class of *Euphorbia*. LINNÆUS,

<sup>1</sup> KRETZ. in *Reichb. Ic. Crit.* t. 881-900.—GREN. et GODR. *Fl. de Fr.* i. 590.—OLIV. *Fl. trop. Afr.* i. 403.—BENTH. *Fl. Austral.* ii. 491.—LEBEL, *Callitr. in Mém. Soc. Cherb.* (1873), 129.—WALP. *Ann.* vii. 944.

<sup>2</sup> These genera comprise true Euphorbiaceæ, proved by the study of the female flowers, their true place in the family not being known, and plants of which only the male flower is known, so that it is impossible to say they are Euphorbiaceæ. They are as follows:

1. *Adenochæton* (FENZL, in *Flora* [1844], i. 212). Menispermaceæ of the genus *Cocculus*.

2. *Antitaxis* (MIERS, *Menisperm.* 12). Euphorbiaceæ, according to BENTH. and HOOKER (*Gen.* 33), but not according to MUELLER (*Prodr.*) 1258. *A. longifolia* MIERS is certainly a Menispermaceæ, type (in *Adansonia*, x. 155) of the genus *Gabila* (see *Hist. des. Plantes*, iii. 19, n. 4).

3. *Austrobuxus* (Miq. *Fl. Ind.-Bat.* Suppl. i. 444). A shrub (?) with opposite simple leaves, and female flowers (these alone known) in cymes (?) in the axil of coriaceous bracts. Ovary naked, ovoid, surmounted by a style with three short trisulcate divisions. Cells biovulate.—1 species from Sumatra: *A. nitidus* (perhaps an Asiatic section of *Amanoa*?).

4. *Calpiggyne* (BL., *Mus. Lugd.-Bat.* ii. 192). Male flowers, calyx 4-fid, subvalvate; 4 central stamens with introse anthers. Three-celled ovary; cells 1-ovulate, styles bifid. A shrub from Borneo and the Celebes, with alternate penninerved leaves and monoecious flowers in spikes (perhaps of the genus *Oladogynos*, p. 18 f.).

5. *Centrodiscus* (M. ARG. in *Fl. Bras. Euphorb.* mox edend. ex coum. oral.) Gen. unknown to us.

6. *Desmonema*, (RAFIN. *Herb.* 23). Considered

by the author as allied to *Euphorbia* and *Tragia*; resembles the former by its long stipitate ovary, but said to have hermaphrodite flowers (North America).

7. *Elæogene* (Miq. *Fl. Ind.-Bat.* Suppl. 460). A tree from Sumatra, with alternate leaves, stellate hairs. Female calyx, 5-partite. Berry with thick coriaceous subliguous pericarp, tricoccate and trispermous (*Baccaurea*?).

8. *Fukrenheitia* (REICHB. F. et ZOLL. in *Linnaea*, xxviii. 599). Calyx and corolla 5-merous. Male flower with 10 stamens. Ovary 3-celled. Capsule 3-coccate, 3-spermous.—1 species from Java, *F. collina* (*Codicium*?).

9. *Forchammeria* (LIEBM. *Nor. Plant. Mex.* Dec. 4). Doubtful Euphorbiaceæ (B. H. *Gen.* 104). Fruit all spongy, mucous. Exalbuminous embryo, with convolute cotyledons (Malvaceæ? ?).

10. *Gerania* (FORSK. *Fl. Æg.-Arab.* 62). Doubtful Euphorbiaceæ (B. H. *Gen.* 330); differing from it by its hermaphrodite flowers (M. ARG. *Prodr.* 1259).

11. *Lascadium* (RAFIN. *Fl. Ludov.* 114). A plant from Louisiana, woolly fragrant with alternate leaves, flowers in umbels, the female surrounded by the male, apetalous. Calyx entire, stamens about 12. Ovary three-celled. Capsule 3-spermous (Crotoneæ?).

12. *Lobocarpus* (WIGHT et ARN. *Prodr.* 7). A woody plant, with glabrous leaves. Flowers axillary 1-3. Calyx 3-fid. Fruit 5-celled. Cells 2-spermous.—1 species (*L. Candolleanus*), from Eastern India, perhaps of the genus *Glochidion* (M. ARG. *Prodr.* 1256).

13. *Mettienia* (GRISEB. *Fl. Brit. W.-Ind.* 43). Male calyx 3-fid. Stamens 7, of which 4 are exterior, with didymous anthers. Female calyx 5-partite. Ovary 3-locular; cells 1-ovulate. Capsule 3-celled. Trees with alternate

in 1738, distinguished it in his *Fragmenta Methodi Naturalis*, under the name of *Tricocca*, which it has kept till now. B. DE JUSSIEU, in 1759, in the garden of Trianon, allowed a class of *Euphorbiæ*,

leaves. Flowers in axillary and terminal dioecious fasciculate racemes.—1 species from Jamaica: *M. globosa* GRISEB.—*Croton globosus* Sw. *Prodr.* 100.—*Ricinus globosus* W. *Spec. iv.* 567. Belongs to the series of the *Hippomanæ* (M. ARG. *Prodr.* 1255).

14. *Phyllobotryum* M. ARG. in *Flora* (1864), 524; *Prodr.* 1231.—H. Bx. in *Adansonia*, xi. 137). United by MUELLER to the *Hippomanæ-Euphorbiæ*, and described as dioecious, this genus must have polygamous flowers, for we have observed one having a young gynæceum, whose ovary was surmounted by a style with three small stigmatiferous lobes. Its pauciovulate placentas, three in number, being parietal, the genus should, perhaps, be separated from the *Euphorbiæ* and joined to the *Bixacæ* or *Saxifragacæ*. The apetalous male flowers have five or six imbricated sepals, surrounded by two or three analogous leaves, which have been described as forming an involucre. The stamens, of indefinite number, inserted on a flat or slightly convex receptacle, are formed of a free upright filament, surmounted by a coloured connective whose edges bear the cells of the anther, nearly triangular, with longitudinal introrse dehiscence. A rudimentary gynæceum, with two or three apiculate projections, may exist in the male flower. *P. spathulatum*, the only known species of the genus, is a tree from western tropical Africa. Its alternate leaves are in fact spatulate, petiolate, accompanied by two stipules. The flowers are epiphyllous, the axis of the axillary inflorescence, which bears a pauciflorous cyme, being raised with the upper surface of the petiole and a portion of the upper surface of the limb.

15. *Phylloxyton* (H. Bx. in *Adansonia*, ii. 54). Male flowers with 3 imbricated sepals and 3 imbricated petals. Stamens 6, on 2 verticils.—Shrub, from Mauritius, with cladodes of *Xylophylla*, aphyllous, with flowers in axillary, amplexiform spikes. Female flower. . . ? (*Santalacæ*? M. ARG. *Prodr.* 1256).

16. *Prætoria* (H. Bx. *Euphorbiæ*, 470;—*Croton incanum* BL.). *Urticacæ* of the genus *Pipturus* (M. ARG. *Prodr.* 1260).

17. *Regnaldia* (H. Bx. in *Adansonia*, i. 187, t. 7, fig. 7, 8). A shrub from Ceylon, with alternate leaves and numerous male flowers in axillary cymes. Calyx of 4 imbricated sepals. Androecium column surrounded by a circular disk, surmounted by a rudiment of the pistil, and bearing below its two 4-merous verticils of stamens. Female flowers. . . ? A genus

probably allied to *Securinega*, *Drypetes*, etc.

18. *Ryparia* (Bl. *Bijdr.* 600.—H. Bx. *Euphorbiæ*, 339). A genus whose male flowers are unknown to us. *R. Cæsia* (*Aspidandra* HASSK. *Cat. Hort. Bog.* ed. nov. 47) will be, perhaps, an *Artocarpad* (M. ARG. *Prodr.* 1258). It seems to be more probably a *Bixacæ*, closely allied to *Osmelia* and *Lunania* of the series of *Samydacæ* (see *Hist. de Plantes*, iv. 307, 308).

19. *Stelechauteria* (DUR.-TH. et H. Bx. in *Adansonia*, iv. 147). Male flowers arranged in small clusters on the stems. Trimerous imbricated calyx. Stamens 4, 5, with introrse anthers, filaments inserted outside a large, urceolate, monophyllous disk, of the same height as the calyx, contracted towards its superior opening, and having unqually cut edges. Female flowers. . . ? Plant from Madagascar (*Euphorbiæ*? biovulate?).

20. *Secretania* (M. ARG. *Prodr.* 227). Male flower with four sepals and four alternate petals, four oppositipetalous stamens, with introrse anthers inserted round a rudiment of gynæceum. Female flower. . . ? Tree from Guiana (*S. loranthacæ*), with alternate leaves, loaded with short, ferruginous hairs, and male flowers in compound racemes. Placed in *Prodromus* near *Savia*, and perhaps allied to the polypetalous *Myrsinacæ* (H. Bx. in *Adansonia*, xi. 137).

21. *Tetragyne* (Miq. *Fl. Ind.-Bat.* Suppl. i. 463). Female flower: calyx 5-phyllous. Ovary with 4 cells, 1 ovulate (or with 2 cells 2 ovulate?) Stigmata 4, linear. Ligneous plant from Sumatra (*T. acuminata*), with alternate leaves and axile flowers (*Aporosa*? M. ARG. *Prodr.* 1254).

22. *Trisyngyne* (H. Bx. in *Adansonia*, xi. 136). Monœcious apetalous flowers, male with membranous, gamophyllous, tubular, obconical calyx, and 4, 5 valvate teeth. Stamens  $\infty$ , with very slender, central, free filaments, and basifixed subapiculate, introrse, linear anthers. Female flower (incompletely known) accompanied by two small leaves (sepals?). Ovary with two uniovulate cells. Style thick, upright, bifid and stigmatiferous at the apex. Trees from New Caledonia, with simple, pinnennerved, alternate leaves. Numerous flowers growing out of an axillary or lateral shoot, the male disposed in cymes, inserted in the axil of a scariosus scale; the female arranged higher on a small, rigid axis in 3-flowered glomerules, compressed together, accompanied by glanduliferous bracts and bractlets in the axils, and two compressed glands, lateral to each glomerule.

which, with fourteen genera of *Euphorbiaceæ*, includes the Box, Papayads, and *Sterculia*. ADANSON<sup>1</sup> also gives too great extent to his *Tithymalus*, in including *Clusia*, *Hernandia*, *Papaya*, *Polygala*, and *Cupania*. A. L. JUSSIEU<sup>2</sup> reduced them a little, but still included the *Cucurbitaceæ*, such as *Sechium*. It was R. BROWN who, in 1815,<sup>3</sup> appears to have first given to this family the name of *Euphorbiaceæ*. Some years after, A. DE JUSSIEU published a monograph<sup>4</sup> which seems really very imperfect, but which was followed for a long time by the botanists of that period, until the time when KLOTZSCH took up, in several of his works,<sup>5</sup> a rapid revision of the *Tricocceæ* of LINNÆUS, to which he added numerous genera, the greater number without much value or which had already been established under other names by former authors. When we undertook, in 1858, a '*General Study of the Group Euphorbiaceæ*,' we found nearly two hundred and sixty genera preserved as valuable, and reduced them to close upon two hundred. At the same time we showed, in several successive publications, that the Box does not belong to *Euphorbiaceæ*,<sup>6</sup> that the families of *Antidesmeæ*,<sup>7</sup> *Putranjivæ*,<sup>8</sup> and *Scepeæ*,<sup>9</sup> are not necessary, although they have been described as distinct, and more or less separated from the *Euphorbiaceæ*, and that they ought to be united with them. Eight years later, J. MUELLER (D'ARGOVIE), drawing up for *Prodromus*,<sup>10</sup> a description of all the known *Euphorbiaceæ*, united a good number of genera that we had preserved, divided several others, and enumerated one hundred and ninety one genera, a dozen of which are insufficiently known. Since this publication, J. MUELLER proposed, in 1872, the genus *Pseudocroton*<sup>11</sup> and elevated *Adenophædra* to the rank of a genus; RADLKOFFER published the genus *Pausandra* in 1870,<sup>12</sup> and we made known the genus *Piranhea* in 1865,<sup>13</sup> *Dissiliaria* of F. MUELLER, in 1867,<sup>14</sup> and, quite recently, the genera *Alphandia*, *Ramelia*, *Choriceras*, *Burcavia*, *Cephalomappa*, *Cocconerion*, and *Trisingyne*.<sup>15</sup>

<sup>1</sup> *Fam. des Pl.* ii. (1763), 346, *Fam.* 45.

<sup>2</sup> *Gen.* (1789), 384, *Ord.* 1.

<sup>3</sup> In *Flind. Voy.* 554; *Misc. Works* (ed. BENN.), i. 28.

<sup>4</sup> *De Euphorbiacearum generibus Medicisque earundem viribus Tentamen*, Paris (1824).

<sup>5</sup> In *Ericks. Arch.* i. 175, 250, t. 7-9; in *Scem. Herald, Bot.*; in *Pl. Mey. ex Act. Acad. Nat. Cur.* xix. 412.—KL. et GRÆKE. *Linn. Nat. Pflanz. Tricocce.* (1860).

<sup>6</sup> H. BN. *Sur la vérité. Organ. du Buis* (in *Bull.*

*Soc. Bot. de Fr.* iii. 285); *Monogr. des Buxacées et des Stylocérées*, Paris (1859).

<sup>7</sup> H. BN. in *Bull. Soc. Bot. de Fr.* iv. 987.

<sup>8</sup> H. BN. *loc. cit.* 989.

<sup>9</sup> H. BN. *loc. cit.* 993.

<sup>10</sup> XV. sect. ii. 1-1273.

<sup>11</sup> In *Flora* (1872).

<sup>12</sup> In *Flora* (1870).

<sup>13</sup> In *Adansonia*, vi.

<sup>14</sup> *Ibid.* vii.

<sup>15</sup> *Ibid.* xi. (1873).

In the present state of our knowledge, there is only one character common to all the *Euphorbiaceæ*: their descendent ovules, whose micropyle is turned upwards and outwards. The number is always definite, but there is sometimes one and sometimes two in each cell. This is the character we employed in the first place, and we still think it is the only one practicable; we have divided all the *Euphorbiaceæ* into uniovulate and biovulate. Other characters, formerly considered to be constant in this family, are now found to be only so in the majority of cases, but are wanting in certain exceptions. First there was the presence of albumen around the embryo; but this sometimes disappears or more often is reduced to a membrane in certain species whose thickened cotyledons become plano-convex, without which, after our manner of limiting the genera, we might exclude other species which have all the other common characters, but where the albumen is thickened in consequence of the foliaceous conformation of the cotyledons. The existence of a placentary projection called by us obturator, is also a nearly constant character, and this organ often attains such a development, that it much exceeds the size of the ovules inserted below it. Evidently we could not, for such differences, place two plants in two distinct genera or even in two distinct families. The *Euphorbiaceæ* are all provided with diclinous flowers, according to most authors; it has been seen that we only consider this character as very frequent, but not as constant. The divisions of the family in *Prodromus*<sup>1</sup> are based on the form of the cotyledons, certain *Euphorbiaceæ* having them much larger than the radicle (*Platylobæ*), whilst others have them thick, semi-cylindrical, or nearly so, and of about the same size as the radicle (*Stenolobæ*); on the præfloration of the calyx, sometimes valvate, sometimes imbricate; on the presence or absence of petals; on the mode of insertion of the androceum, sometimes in the centre of the receptacle, sometimes under the base of a central body (usually a rudimentary gynæceum<sup>2</sup>); on the form of the stamens, whose anthers have the cells longitudinally adnate to the connective, or free and only attached by an extremity, and whose filament is upright from the bud or incurvate at that period in such a manner as to bear outwardly the front of the anther, which is

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<sup>1</sup> See the table in this volume, p. 189.

<sup>2</sup> Frequently described as a central disk.

interior when the filament is erect; on the consistency of the pericarp, sometimes dehiscent and sometimes indehiscent; and finally on the presence or absence of an arilate thickening, more or less general or limited to the neighbourhood of the micropylar regions (caruncula); all characters, which we see, are sufficient at need to distinguish two genera from one another, when there are also other important differences between them, but which generally are not sufficient of themselves to distinguish the groups of a higher order.<sup>1</sup> Finally we have preserved the following series which we characterize as follows:

A. Uniovulate Euphorbiaceæ.

I. EUPHORBIEÆ.—Flowers generally hermaphrodite, regular or irregular, with involucriform calyx, provided with glands alternate with its divisions. Stamens  $\infty$ , with articulate filaments, inserted around a stipitate gynæceum, whose ovary is or is not accompanied at its base by an hypogynous disk. Glands or bracteoles arranged inside the perianth in bundles alternate with the staminal bundles.—2 genera.

II. RICINEÆ.—Flowers unisexual, apetalous. Stamens in indefinite numbers, polyadelphous, central or peripheric.—3 genera.

III. JATROPHEÆ.—Flowers unisexual, with or without petals. Calyx valvate or imbricate, with or without glandular disk. Stamens in number definite or indefinite, inserted in the centre of the flower or around a central body. Staminal filaments rectilinear, upright, or slightly incurvate, sometimes folded in the bud.—88 genera.

IV.—CROTONÆÆ.—Flowers unisexual, with or without petals and provided with a glandular disk. Calyx valvate or imbricate. Number of stamens nearly always indefinite, inserted on verticils in the centre of the projecting floral receptacle, with introrse anthers, infracto-incurvate in the bud on account of the curvature of the filament.<sup>2</sup>—4 genera.

V.—EXCÆCARIÆÆ.—Flowers unisexual, apetalous nearly always trimerous and calyx usually imbricate, generally destitute of glandular disk. Stamens central, alternate with the divisions of the calyx when they are (which is usual) in equal number. Flowers usually arranged

<sup>1</sup> See *Adansonii*, xi. 72.

<sup>2</sup> Really extrorse before anthesis.



in spikes, simple or formed of glomerules, with bracts laterally glandular at the base.—12 genera.

B. Biovulate Euphorbiaceæ.

VI. DICHAPETALÆ.—Flowers hermaphrodite or more rarely polygamous, perianth double, regular or irregular, petals free or united in a regular or irregular gamopetalous corolla. Stamens fertile, in number fewer or equal to the petals, hypogynous, perigynous or epigynous. Fruit incompletely dehiscent. Seeds exalbuminous.—3 genera.

VII.—PHYLLANTHÆ.—Flowers unisexual, perianth simple or regular, petals free or wanting, hypogynous or perigynous, stamens in definite or indefinite numbers inserted in the centre of the flower or round a central body (rudimentary gynæceum). Fruit dehiscent or indehiscent. Seeds with or without albumen.—37 genera.

VIII. CALLITRICHÆ.—Aquatic plants, flowers unisexual or more rarely polygamous perianth (?) simple, 2-merous. Stamens 1-2. Gynæceum 2-carpellary, with ovary cells subdivided into two uniovulate compartments. Fruits separable into four dry, monospermous parts (demi-cells). Cells albuminous.—1 genus.

This family, so divided, has many affinities. They were formerly especially sought amongst the apetalous groups, and there have often been united to the *Euphorbiaceæ* all the types formerly united under the name of *Urticaceæ*. The *Scæpæ* and the *Antidesmeæ* above all have frequently been connected with the latter, without doubt on account of their amentaceous inflorescence.<sup>1</sup> Now we know well the slight value of this character, there only remains, it is said, to distinguish the *Euphorbiaceæ* from the *Urticaceæ* proper, the simple styles of the latter, the absence of the aril in the seeds and the difference of properties.<sup>2</sup> The *Artocarpeæ* have often the style divided, which indicates the primitive existence of many carpellary leaves, only one of which is developed in its ovary; and their milky juice gives them properties analogous to the *Euphorbiaceæ*; but the inflorescence has usually a particular configuration; and an *Artocarpus* may always be recognised at first sight by the arrangement of its stipules in the form of a conical hood, which envelopes all the extreme parts of the branches and leaves

<sup>1</sup> ENDL. *Gen.* 287, Ord. 96; 288.

<sup>2</sup> See WEDD. *Monogr. Urtic.* 39.

a short distance from the leaf an annular cicatrice. The true affinity of the *Euphorbiaceæ* with many highly organised polypetalous families, has been especially supported by R. BROWN, and, after him, by LINDLEY.<sup>1</sup> The latter has placed them by the side of *Malvaceæ*, and is imitated in that by a large number of contemporary botanists.<sup>2</sup> "For myself," I said, in 1858, "I consider the *Euphorbiaceæ* as so closely allied to *Malva*, that I look on them as constituting two perfectly parallel series. In applying to each this prolific principle of collateral development, I succeed, in fact, if I am not mistaken, in establishing two series where each limit is represented, always with the differences of numerical proportion which have here only a secondary importance." In the first of these series is found the *Malvas* as they are limited by Lindley. In considering principally the plants with monospermous or dispermous cells, we find the flowers generally hermaphrodite, more rarely unisexual, often petalous, more often apetalous, albumen scarce, more rarely in large quantity, and the anatropal ovule with inferior micropyle. In the second, which represents the *Euphorbiaceæ*, according to us, hermaphrodite flowers are to be met with in only a couple of types, usually unisexual, more often destitute of than provided with corolla, the perisperm in an always noticeable quantity, and the anatropous ovule with the micropyle turned upwards. On the other hand, the *Geraniaceæ* and *Linaceæ* are also closely allied to the *Euphorbiaceæ*.<sup>3</sup> *Linum* does not differ from certain *Euphorbiaceæ*, such as *Jatropha*, except in the hermaphrodite flowers, the organisation and consistence of the pericarp, and the large development of the embryo in proportion to the inconsiderable albumen. The *Euphorbiaceæ* affect also a more distant resemblance with the *Rhamnaceæ* and *Celestraceæ* by medium of the *Buxææ*, *Quassiacæ*, the *Turpini* (*Picramnia*), and allied genera, the *Burseraceæ*, and above all the *Ulmaceæ*, which would differ very little from *Hymenocardia*, if one of the ovary cells was not arrested in its development.<sup>4</sup>

The *Euphorbiaceæ* present every possible variation in their organs

<sup>1</sup> *Introd.* ed. 2, 112: *Veg. King.* 275.

<sup>2</sup> AD. BR. *Enum.* (1843), 79, Fam. 140.—  
ENDL. *Gen.* 1107, Ord. 243.

<sup>3</sup> *Et Gen. Euphorbiac.* 247. We might, more-

\* over, for the details of the question, refer to this passage.

<sup>4</sup> See H. BN. *loc. cit.* 249-254.—J. G. AG. *Theor. Syst. Plant.* 294.

of vegetation.<sup>1</sup> The stems are sometimes herbaceous, sometimes frutescent, upright or climbing, volubile, sometimes arborescent, and even occasionally attaining considerable dimensions. Sometimes the axes, as in *Xylophylla*, are flattened in cladodes, and sometimes, as in certain species of *Euphorbia* and *Pedilanthus*, they become fleshy and cactiform. The leaves are usually alternate, rarely opposite or verticillate, often provided with stipules, and even with stipels, pretty often unsymmetrical at the base.<sup>2</sup> The branches, leaves, and stipules, may be changed into spines. The existence of glands is very frequent in these plants, above all on the leaves and bracts, or else occupying tolerably often the lateral place of the stipules, and in the flowers, where they sometimes form highly developed disks. Hairs are very common in this family, simple, glandular, stellate, peltate, or squamate, occasionally compound;<sup>3</sup> they are sometimes even in the interior of the ovary cells. But that which, at all times, has been the most noticed amongst the general characters of these plants, is the existence of a peculiar milky sap. In truth, this point has been singularly exaggerated, for the latex is scarcely observed with this quality in half the species of the family. But the reservoirs of the latex often present in these a particular organisation.<sup>4</sup> They form tubes, usually long, ramified, and spreading abundantly throughout the parenchyma of the fundamental tissue. The partitions are generally thick, and often to such a degree that the transverse section resembles that of the fibres of the liber, with which it has even been many times totally assimilated. It is moreover in the neighbourhood of the liber bundles that they are most developed, taking their places in certain cases. The branches, very numerous in general, are directed inwards and outwards, sometimes completely transverse, towards the pith on one part, on the other through the bark, arriving even, in certain species, close to the surface of the stem, very numerous and very ramified, above all, towards the insertion of the leaves. In some, these are true ducts; in others,<sup>5</sup> they are only large ramified cellules, belonging essentially

<sup>1</sup> This question is also treated with details in the *Et. Gén. Euphorbiac.* 209-241.

<sup>2</sup> Usually (but not constantly) the side of the leaf which is most enlarged at its base, is that which is found between the medial nerve and the branch (H. Bn. *Euphorbiac.* 221), whilst in the *Urticaceæ*, for example, the opposite has been observed (WEDD. *Monogr. Urtic.* 12).

<sup>3</sup> These false compound, ramified, and glandular hairs are generally the nerves of the leaves,

with glandular apex, foliaceous lobes, or stipules whose parenchyma is not developed, but takes all its growth abnormally in certain circumstances, and explains in this manner the true meaning of these organs.

<sup>4</sup> THECUL, in *Compt. Rend. Acad. Sc.* lxi. 1849; in *Adansonia*, vii. 159.

<sup>5</sup> G. DAVID, *Ueb. die Milchzell. d. Euphorb.* Breslau (1872).

to the fundamental parenchyma of the plant, lengthening immoderately, vertically, and also laterally, in such a manner as to insinuate themselves into the intervals of the other anatomical elements; their contents must penetrate into the latter according to circumstances which are still imperfectly known. But what seems certain is that the quantity is not always the same in the lactiferous reservoirs. The latex is sometimes opaline or almost completely uncoloured, and sometimes opaque and milky. It is often rich in caoutchouc, and is usually distinguished by another peculiarity, the presence of small retilinear, bacteriform, linear bodies, whose reaction is the same as starch.<sup>1</sup> There are in certain *Euphorbiaceæ* saps of quite another nature; they are coloured liquids, usually rose purple. They are met with in many flowers, notably in *Tournefortia*, *Mercurialis*, *Lasioscrotum*, *Plunketia*, or in the seeds, pretty often also in the organs of vegetation.

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The *Euphorbiaceæ*, actually known to the number of nearly three thousand two hundred and sixty-two species, are very unequally dispersed over the entire surface of the globe. The genus which extends over the largest area is the genus *Euphorbia*, which exists everywhere, as well in warm regions as in cold and temperate countries, to the north of Europe and Asia on one side, and, on the other, to the extreme south of Africa, Patagonia, and New Zealand. The number of genera well known to be allied to the family and which belong properly to the old world, are seventy-four, and America has only forty. The genera common to both are therefore twenty-three, but these are in general the largest and most numerous in species, for they comprise nearly two thousand four hundred and thirty, while the forty purely American genera, nearly all less important in number of species, include only seventy-two. In the genera peculiar to the old world, we count five hundred and eighty species.

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<sup>1</sup> Hofmeister admits that the grains of starch of the latex of certain *Euphorbiaceæ* constitute an exception, as they do not cease to grow when they are no longer in contact with the

protoplasmic substances; but there are some of these substances in the latex (Sachs): so that the exception is only apparent.

Moreover, if we take account of the number of species proper to America for the genera it has in common with the old world, we calculate that it possesses altogether eighteen hundred and twenty-two species of *Euphorbiaceæ*, the four hundred and fifty others belonging to the old world. Everywhere, moreover, we find the species are not in great number except in the warmest regions, there being no exception but the genus *Euphorbia*. The family of *Euphorbiaceæ* represents very nearly, according to most calculations, the fortieth part of the *Phanerogamia*, distributed over the globe. Europe is the poorest in genera of the five parts of the world, only possessing five (besides the *Callitriche*), and even three of these, *Tournesolia*, *Andrachne*, and *Securinega*, are only represented by a single species, and the genus *Mercurialis* by four or five. The Australian genera are frequently remarkable for a peculiar aspect and foliage; by their linear cricoid leaves, answering to the embryo with narrow and semi-cylindrical cotyledons; to this country belong all the genera with "stenolobate" embryos. There are besides in this group, as in many others, a certain number of ubiquitous plants which have followed man in his migrations, either on account of their utility, or because the seeds are mixed with those of the crops. Such are *Euphorbia Lathyris*, *Peplus*, *Helioscopia*, our annual *Mercurialis*, and, in warm countries only, for they cannot support a rigorous climate, several species of *Phyllanthus* and *Acalypha*, which, like certain species of *Urtica*, have become what are called, not without reason, "the bad herbs of tropical regions".<sup>1</sup>

The most active Euphorbiaceæ owe their properties<sup>2</sup> to the latex or to the oily and resinous substances contained in the seeds.<sup>3</sup> Amongst these last, must principally be mentioned *Euphorbia*, *Ricinus*, *Jatropha*, and *Pignon d'Inde* (Fr.) The ancients frequently employed, as evacuants, the seeds of *Euphorbia Lathyris*<sup>4</sup>

<sup>1</sup> On the questions of detail touching the geographical distribution, see ENDL. *Enchirid.* 589.—LINDL. *Veg. Kingd.* 276.—H. BN. *Et. Gén. Euphorbiac.* 242.—A. DC. *Géogr. Bot. Rais.* 328, 685, 700, 707, 753, 759, 1045, 1281, etc.

<sup>2</sup> ENDL. *Enchirid.* 590.—LINDL. *Veg. Kingd.* 276.—A. JUSS. *Euphorb.* 73.—GUTH. *Drog. Simpl.* éd. 6, ii. 336-368.—PEREIRA, *Elem. Mat. Med.* ed. 4, ii. p. i. 399.—ROSENTH. *Syn.*

*Pl. Diaphor.* 807-841, 1154.

<sup>3</sup> These seeds are, in the useful species, provided with albumen and an embryo. The opinion (which must be abandoned), was formerly everywhere professed that the principles contained in the latter are completely different from those of the others, more acrid, more venomous.

<sup>4</sup> *Euphorbia Lathyris* L. *Spec.* 655.—DC. *Fl. Fr.* iii. 333.—GREN. et GODR. *Fl. de Fr.*

(fig. 143-150), from which an oil with powerful properties is extracted, still used in the country, which purges well even if the dose is feeble, but it unfortunately sometimes causes violent vomiting, which might occasion a serious accident. The seeds of *Ricinus* employed for the extraction of a purgative oil are those of a single species, *Ricinus communis*<sup>1</sup> (fig. 153-162); but it has many forms and varieties, and above all are distinguished two species of *Ricinus* of France or Europe,<sup>2</sup> those of America,<sup>3</sup> and those of Africa or Senegal. The last are the least employed. Those of France are the smallest, pale, and not very distinctly marbled. Those of America, larger, marbled more distinctly, and darker, have been for a long time imported into Europe. All yield the purgative oil by different processes, but principally by pressure when cold, or at a temperature of medium warmth. The oilcake is besides more active for purging than the oil itself, sometimes totally void of acrid principle, and, as we know, employed as an aliment or condiment in certain countries. This oil is powerful<sup>4</sup>. It is much less drying than that of the large *Pignon* of India or *Jatropha* of Barbadoes<sup>5</sup> (fig. 163-165), extracted from a much larger, black, finely rugose seed, covered all over with folds in the form of wrinkles, only produced on the surface as the seed dries up. This oil, often rancid, is very acrid and purges energetically in a dose of ten drops. This is again much surpassed by the small *Pignon* of India or the seeds of the *Croton Tiglium*<sup>6</sup> (fig. 196-202), whose general appearance re-

iii. 98.—GUIB. *loc. cit.* 340, fig. 445.—PEREIRA, *op. cit.* 412.—REV. in *Bot. Méd. du XIX<sup>e</sup> Siècle*, ii. 13.—ROSENTH. *op. cit.* 818.—BOISS. *Prodr.* 99, n. 384. (*Grande Catapuce, Grande Esule, Ginoisèle*.)

<sup>1</sup> *Ricinus communis* L. (see p. 110, note 2).—MÉR. et DEL. *Dict. Mat. Méd.* vi. 86.—GUIB. *loc. cit.* 350, fig. 450.—REV. in *Fl. Méd. du XIX<sup>e</sup> Siècle*, iii. 214, ii. 21.—PEREIRA, *Elém. Mat. Méd.* éd. 4, p. i. 416.—LINDL. *Fl. Méd.* 183.—CAZ. *Pl. Méd. Indig.* éd. 3, 914.—M. ARG. *Prodr.* 1017. (*Palma Christi, Paumc-Dieu, Herbe à l'huile américaine, de castor, de Kerva*.)

<sup>2</sup> GUIB. *loc. cit.* fig. 452.

<sup>3</sup> GUIB. *loc. cit.* fig. 451.

<sup>4</sup> They contain, it is said, ricinolic acid (C<sup>36</sup>H<sup>34</sup>O<sup>6</sup>); it is soluble in any proportion in absolute alcohol. The ricinine, which has been extracted, has been compared to the alkaloids,

and crystallizes in prisms. By dry distillation it gives cenanthylic acid, cenanthylic aldehyde and acrolein. SOUBEIRAN admits they contain a special purgative principle which has till now escaped chemists. The fact that the seeds themselves are much more active than the extracted oil, here as in most other *Euphorbiaceæ*, seems to be the proof.

<sup>5</sup> *Jatropha Curcas* L. *Spec. ed.* 1, 1006.—A. JUSS. *Euphorb.* t. 11, fig. 34 A.—MÉR. et DEL. *Dict. Mat. Méd.* iii. 674.—GUIB. *loc. cit.* 354 fig. 454.—M. ARG. *Prodr.* 1076.—*Curcas purgans* MED. *Ind. Pl. Hort. Manhem.* i. (1771), 90.—ROSENTH. *op. cit.* 828.—PEREIRA, *op. cit.* 426.—*C. indica* RICH. *Cub.* iii. 288.—*Castigliona lobata*, R. et PAV. *Prodr.* 139, t. 37. (*Noix américaine, Figue d'enfer, Pignon de Barbavie*.)

<sup>6</sup> L. *Spec.* 1004.—GUIB. *op. cit.* ii. 357, fig. 456.—MÉR. et DEL. *Dict. Mat. Méd.* ii. 477.

sembles that of the preceding, but which are distinguished by the uniform dull yellow tint (or blackish brown when they have lost their outer coat), in size a little less or at most nearly equal to our *Ricinus*, and by the projection, often very slight, of three longitudinal lines which they bear on the sides, and on the middle of the interior face. The oil called *Croton*, pressed from these seeds, is inwardly a powerful purgative in a small dose of one or two drops, and outwardly, a rubefacient and eruptive of terrible causticity. Among other seeds of *Euphorbiaceæ*, rich in purgatives, we must yet mention those of *Anthostema Aubryanum*,<sup>1</sup> a shrub from the Gaboon, reported the most powerful of all; *Jatropha multifida*,<sup>2</sup> large as filberts, often employed in warm countries; of the wild *Jatropha* or *Jatropha gossypifolia*,<sup>3</sup> very small, but equally active as evacuants, and used in tropical America and Africa; of *Aleurites moluccana*,<sup>4</sup> having the shape and size of a small chestnut with a stony envelope, and which, purging much less energetically, may, under certain conditions, be employed as an aliment; those of the *Andaçu* of Brazil,<sup>5</sup> often two in number in a thick and voluminous stone, slightly tetragonal, broader than long and also rich in purgative oil, analogous in its properties to that of *Ricinus*; those again of *Hura crepitans*<sup>6</sup> (fig. 216-218), ten or twenty in number,

—LINDL. *Fl. Med.* 181.—KL. in *Hayn. Arzn.* xiv. t. 3.—PEREIRA, *Elem. Mat. Med.* cd. 4, ii. p. i. 403.—ROSENTH. *Syn. Pl. Diaph.* 835.—REV. in *Fl. Méd. du XIX<sup>e</sup> siècle*, i. 421.—L. MARCH. in *Adansonia*, i. 232, t. 9, 10.—BERG. et SCHM. *Off. Gew. (Croton)*.—MOQ. *Bot. Méd.* 399, fig. 108.—C. PARANA WALL. *Cat. n.* 7722 A.—C. JAMALGOTA HAM. in *Trans. Linn. Soc.* xiv. 258.—*Tiglitum officinale* KL. in *Nov. Act. Nat. Cur.* xix. Suppl. i. 418. (*Bois des Moluques, purgatif, de Pavane, de Tigli*).

<sup>1</sup> H. BN. in *Adansonia*, v. 366, not. According to AUBRY-LECOMTE, a single drop of the oil extracted from the seeds purges violently.

<sup>2</sup> *Jatropha multifida* L. *Spec.* 1006.—DESR. in *Lamk. Dict.* iv. 10.—SW. *Obs.* 368.—GUIB. *loc. cit.* 356, fig. 455.—PEREIRA, *op. cit.* 426.—M. ARG. *Prodr.* 1089, n. 35.—*Adenorhopium multifidum* POHL, *Pl. Bras.* i. 16. (*Arbre de corail, Médecinier d'Espagne, Noisetier purgatif, grand Ben purgatif*).

<sup>3</sup> *J. gossypifolia* L. *Spec.* 1006.—SW. *Obs.* 336.—M. ARG. *Prodr.* 1086.—MÉR. et DEL. *Dict. Mat. Méd.* iii. 676.—ROSENTH. *op. cit.* 828.—GUIB. *loc. cit.* 354, fig. 453. (*Herbe au*

*mal de ventre, Médecinier à Feuilles de Cotonnier, de Staphisaigre, de Groseillier*.)

<sup>4</sup> *Aleurites moluccana* W. *Spec.* iv. 590.—M. ARG. *Prodr.* 723.—*A. triloba* FORST. *Char. Gen.* 112, n. 56.—*A. commutata*, GEISEL. *Crot. Mon.* 82.—*A. ambigua* PERS. *Synops.* 587.—A. JUSS. *Euphorb.* t. 12.—*Camirium cordifolium* GERTN. *Fruet.* ii. 195.—*C. oleosum* REINW.—*Juglans Camirium* LOUR. *Fl. Cochinch.* (ed. 1790), 573.

<sup>5</sup> *Johannesia princeps* VELLOZ. *Alograf.* 199.—M. ARG. *Prodr.* 716.—*Anda Gomesii* A. S. H. *Pl. Us. Bras.* t. 54, 55.—H. BN. in *Adansonia*, iv. 284; in *Dict. Encycl. Sc. Méd.* iv. 304. *A. brasiliensis* RADDI, *Mém. Quar. Plant. Bras.* 25.—*Andisens pentaphyllus* VELLOZ.—*Aleurites pentaphylla* WALL.—GUIBOUT distinguishes (*op. cit.* 361, fig. 460) another *Anda* of Brazil, with a round seed, which is perhaps a *Jatropha*.

<sup>6</sup> *Hura crepitans* L. *Spec.* 1431.—TURP. in *Dict. Sc. Nat. Atl.* t. 279.—SPACH, *Suit. à Buffon*, t. 76.—H. BN. *Euphorb.* t. 6.—M. ARG. *Prodr.* 1229.—GUIB. *loc. cit.* 360, fig. 459. Same properties in *H. polyandra* (H. BN. *Euphorb.* 544), a Mexican species.

they are found placed one in each of the cells of this singular fruit, which sometimes disaggregates and opens with great noise; they are lenticular, flattened, the outline orbiculate and surface smooth. Many other *Euphorbiaceæ* might without doubt be utilized for the same purpose<sup>1</sup>, when the seeds are of sufficient size; but they have scarcely been employed. There are some whose edible kernel contains no dangerous principle: such as the nuts of St. Domingo, produced by *Omphalea triandra*; <sup>2</sup> *Caryodendron orinocense*,<sup>3</sup> eaten in New Granada, and *Jatropha Heudelotii*,<sup>4</sup> whose pericarp is said to be equally edible.<sup>5</sup> Generally, the ripe seeds are covered by a dry and resisting coat; but sometimes also the exterior coat thickens, presenting a totally different consistence. In certain species of *Buccaurea*, it has even been described at a certain epoch as a sapid aril and filled with juice, eating like a fleshy fruit.<sup>6</sup> In the Tallow tree<sup>7</sup> it forms all round the seed a thick and white tunic, whose meshes are filled with a wax as useful as that of the bee. In the *Kamala* of India,<sup>8</sup> the seed seems sprinkled with small reddish grains, which are so many isolated, complicated vesicles, dependent from the external seminal coat, and which

<sup>1</sup> In Arabia they use those of *Jatropha glauca* VAHL et *glandulosa* VARI; in America of *J. herbacea* L. At Sierra Leone they employ as poison for rats, etc., the fruit of *Dichapetalum toxicarium* (*Chaillietia toxicaria* DOX) or the seed? (See H. BN. in *Diet. Encycl. Sc. Méd.* xiv. 631.)

<sup>2</sup> L. Spec. 1377.—H. BN. *Euphorbiac.* 529, t. 7, fig. 6-9.—M. ARG. *Prodr.* 1136, n. 5.—LINDL. *Veg. Kingd.* 280.—ROSENTH. *op. cit.*, 825.—O. *nucifera* Sw. Obs. 95. The seeds are also edible in *O. diandra* L. (*O. cordata* Sw.), ou *Liane à l'anse*, *L. papaye* from the Antilles, used to prepare green walnuts, and the leaves topically in treating old ulcers.

<sup>3</sup> KARST. *Fl. Columb.* 91, t. 45.—M. ARG. *Prodr.* 765 (vulg. *Tacai*). The albumen furnishes a sort of butter which is said to be perfectly edible.

<sup>4</sup> H. BN. in *Adansonia*, i. 64; xi. 134.—M. ARG. *Prodr.* 1083, n. 17.—*Ricinodendron africanum* M. ARG. in *Flora* (1864), 533; *Prodr.* 1111.

<sup>5</sup> The pericarp is edible and fleshy in *Antidesma Dallachyanum* H. BN. an Australian species. Animals eat that of *Securinega Leucopyrus* M. ARG. (*Flueggea Leucopyrus* W.), white and fleshy like the berry of a *Symphoricarpos*. In the *Phyllanthus Emblica* (L. Spec.

1393;—H. BN. *Euphorbiac.* 637, t. 24, fig. 20-24;—*Emblica officinalis* GÆRTN. *Fruet.* ii. 122, t. 108;—*Dichælectina nodicaulis* HANCE, *Pl. Chin.* i. 2), it is the fruit which constitutes the *Myrobalans emblics* or *Spondias*, formerly employed as laxative, cooling, etc. (GUIB. *op. cit.* ii. 361.—LINDL. *Fl. Méd.* 176. ROSENTH. *op. cit.* 838.)

<sup>6</sup> Notably in the *B. ramiflora* and *cauliflora* LOUR. in Cochinchina; in the *B. dulcis* (*Pierrardia dulcis* JACK), from Sumatra; and in the *B. racemosa* (*Pierrardia racemosa* BL.), from Java, (vulg. *Menting*).

<sup>7</sup> *Excoecaria sebifera* M. ARG. *Prodr.* 1210, n. 17.—*Croton sebiferus* L. Spec. ed. 3, 1425.—*Triadica sinensis* LOUR. *Fl. Cochinch.* 610.—*Stillingia sebifera* MICHX. *Fl. Bor.-Amer.* ii. 213.—*S. sinensis* H. BN. *Euphorb.* 512, t. 7, fig. 26-30.—*Stillingia sebifera* BOJ. *Hort. Maur.* 284.

<sup>8</sup> *Echinus philippinensis* H. Bx. in *Adansonia*, vi. 314.—*Rottlera tinctoria* W. Spec. iv. 832. GUIB. *op. cit.* ii. 367, fig. 462.—*Croton philippinensis* LAMK. *Diet.* ii. 206.—*C. punctatus* RETZ. Obs. v. 30.—*C. coccineus* VAHL, *Symb.* ii. 97.—*C. montanus* W. Spec. iv. 615.—*Mallotus philippinensis* M. ARG. in *Linnæa* (1865), 196; *Prodr.* 980, n. 68.



resembles so many small distinct glands, encircled by cellules in masses to which the resinous contents give a red colour more or less brown or crimson. This sort of coloured flour has served for a long time in India to dye silks; it was introduced into Europe some years since as the best dye known to the Indians. There are many other plants among the *Euphorbiaceæ* with colouring and tinctorial properties. Those which contain the reddish juices we have spoken of, which desiccation renders more or less bluish, like our *Mercurialis*, are especially of this kind. The best known in Europe is *Tournefortia tinctoria*,<sup>1</sup> which grows in the region of the Mediterranean, and is cultivated principally at Grand-Gallargues for the manufacture of turnsole with rags. The rags impregnated with juice pressed from this plant are submitted to the action of ammonia, which reddens them; and the colouring matter then serves for tinting cheese, liqueurs, syrups, and preserves. It has also been proposed to prepare turnsole in cakes. *Mercurialis perennis*,<sup>2</sup> which colours paper blue, has also been proposed as a dye plant, and the same with *M. annualis*<sup>3</sup> (fig. 177-184); but these slightly active plants are best known at present as laxative medicines.<sup>4</sup> This property resides in their organs of vegetation, and it is the same with many species of *Euphorbia* acting as evacuant remedies. *Euphorbia Ipecacuanha*,<sup>5</sup> from North America, is an energetic vomitive,

<sup>1</sup> *Croton tinctorius* L. *Spec.* 1004.—GEISEL, *Crot. Mon.* 68.—DC. *Fl. Fr.* iii. 347.—*C. verbascifolius* W. *Spec.* iv. 539.—*C. patulus* LAG. *Nov. Gen. et Spec.* 21.—*C. villosus* SETH. et SM. *Fl. Græc.* t. 951.—*C. oblongifolius* SIEB. ex SPRENG. *Syst.* iii. 850.—*Crotophora tinctoria* A. JUSS. *Euphorb.* t. 7, fig. 25.—NEES, *Gen.* ii. t. 37.—JOLY, *Obs. sur les Pl. à coul. bleue.* t. 5.—REICHB.  *Ic. Fl. Germ.* v. t. 52.—GUIB. *op. cit.* ii. 342.—LINDL. *Fl. Med.* 178.—ROSENTH. *op. cit.* 837.—M. ARG. *Prodr.* 748.—*C. verbascifolia* A. JUSS. *loc. cit.* 28.—*C. integrifolia* BUNGE, *Rel. Lchn.* 450.—*C. hierosolymitana* SPRENG. *loc. cit.* (*Tournefort, Hélotrope, Gabbéré, Herbe de Clytie.*)

<sup>2</sup> *Mercurialis perennis* L. *Spec.* 1465.—DC. *Fl. Fr.* iii. 328.—GREN. et GODR. *Fl. de Fr.* iii. 99.—REICHB.  *Ic. Fl. Germ.* v. t. 152.—MÉR. et DEL. *Dict. Mat. Med.* iv. 372.—GUIB. *op. cit.* ii. 342.—LINDL. *Fl. Med.* 188.—M. ARG. *Prodr.* 796, n. 5.—H. BN. in *Dict. Encycl. Sc. Méd.* p. ii. vii. 90.—*M. ovata* HOST, *Fl. Austr.* ii. 666.—*M. Cynocrambe* SCOP. *Fl. Carniol.* ii. 666. (*Chou*

*de chien, M. sauvage, des bois, de montagne.*)

<sup>3</sup> *M. annua* L. *Spec.* 1465.—DC. *Fl. Fr.* iii. 328.—GREN. et GODR. *Fl. de Fr.* iii. 99.—REICHB.  *Ic. Fl. Germ.* v. t. 151.—PAYER, *Organog.* t. 110.—GUIB. *op. cit.* ii. 342.—MOQ. *Bot. Méd.* 34, fig. 3, 4.—H. BN. *Euphorbiae.* t. 9, fig. 12-29; in *Dict. Encycl. Sc. Méd.* p. ii. vii. 89.—*M. ambigua* L. F. *Dec.* i. 15, t. 8.—*M. ciliata* PRESL, *Del.* 56.—*M. Huetii* HANR. (*Foirolle, Leuzette, Cagarille, Ramberge, Vignette, Ortie bâtarde, O. morte, Marcois, Mercoret, etc.*)

<sup>4</sup> There has sometimes been employed for the same purpose the *M. elliptica* VENT. et *tomentosa* L. SPRENGEL thinks that the latter must be the Φάλλον of DIOSCORIDE (see H. BN. in *Dict. Encycl. Sc. Méd.* p. ii. vii. 90.

<sup>5</sup> L. *Amœn.* iii. 117.—LORD, *Bot. Cab.* t. 1145.—*Bot. Mag.* t. 1794.—BOISS. *Prodr.* 101, n. 391.—BIGEL. *Med. Bot.* iii. t. 52.—*E. gracilis* ELL. *Sketch.* ii. 657.—*E. portulacoides* L. *loc. cit.*—*Anisophyllum Ipecacuanhe* HAW. *Fl. Succ.* 164.

and its stem makes one of the false white American *Ipæacuanhas*. Nearly all our European species of *Euphorbia* are vomitive and purgative hydragogues, and cannot be handled without care, particularly *E. Cyprarissias*,<sup>1</sup> *Esula*,<sup>2</sup> *Gerardiana*,<sup>3</sup> *Helioscopa*,<sup>4</sup> *Peplus*,<sup>5</sup> *Pithyusa*,<sup>6</sup> etc.<sup>7</sup> They owe their powerful properties sometimes to the latex they contain, which becomes so abundant in the cactiform species of warm countries, often cultivated in our hothouses, such as *E. nerifolia*,<sup>8</sup> *canariensis*,<sup>9</sup> *antiquorum*,<sup>10</sup> *grandidens*,<sup>11</sup> *virosa*,<sup>12</sup> *abyssinica*,<sup>13</sup> *Caput-Medusæ*,<sup>14</sup> *meloformis*,<sup>15</sup> *globosa*,<sup>16</sup> *triaculeata*,<sup>17</sup> *candelabrum*,<sup>18</sup> and *officinarum*.<sup>19</sup> The production of the gum resin of *Euphorbia* was for a long time attributed to the latter species, this substance is yielded by the *E. resinifera*<sup>20</sup> of Morocco, and consists of a dry, yellowish, friable, acrid, sternutatory juice, nearly as vesicative as cantharides, and whose employment as a purgative is generally abandoned as too dangerous. The number of *Euphorbiaceæ* with irritant, poisonous latex, is considerable,<sup>21</sup> and this latex generally flows in abundance from incisions made in the trunk or branches. The most celebrated are: the Manchineel,<sup>22</sup> particularly common in

<sup>1</sup> L. Spec. 661.—BOISS. Prodr. n. 636. (*Petit Cyprès, Rhubarbe des pauvres.*)

<sup>2</sup> L. Spec. 660.—BOISS. Prodr. n. 637. (*Grande-Esule Embrunchée.*)

<sup>3</sup> JACQ. Fl. Austr. v. 17, t. 436.—BOISS. Prodr. n. 668.—(*E. de Gérard.*)

<sup>4</sup> L. Spec. 658.—BOISS. Prodr. n. 539. (*Réveil-matin, Omblette, Lait de couleuvre, etc.*)

<sup>5</sup> L. Spec. 658.—BOISS. Prodr. n. 555.—*E. peploides* GRISEB. (*Petit Réveil-matin.*)

<sup>6</sup> L. Spec. 656.—BOISS. Prodr. n. 587.—GREN. et GODR. Fl. de Fr. iii. 86 (*à feuilles de Genévrier*).—*E. mucronata* LAF.

<sup>7</sup> See ROSENTH. op. cit. 81 0-818.

<sup>8</sup> L. Hort. Cliff. 196 (part.).—DC. Pl. Gr. ii. t. 46.—BOISS. Prodr. n. 292.—*Ligularia*... RUMPH. Herb. Amb. x. t. 40.

<sup>9</sup> L. Spec. 646.—BOISS. Prodr. n. 314.

<sup>10</sup> L. Hort. Cliff. 196.—BOISS. Prodr. n. 302.—*Schadidecalli* RHEED.

<sup>11</sup> HAW. in Phil. Mag. (1825), 33.—BOISS. Prodr. n. 310.—*E. arborescens* hort.

<sup>12</sup> W. Spec. 832.—BOISS. Prodr. 315.

<sup>13</sup> REUSCH. Nom. Bot.—BOISS. Prodr. n. 318. (*Kotquall*, from Abyss. ex BRUCE.)

<sup>14</sup> L. Hort. Cliff. ii. 135.—Lodd. Bot. Cab. t. 1315.—BOISS. Prodr. n. 326.

<sup>15</sup> ART. Hort. Kew. ii. 135.—BOISS. Prodr. n.

332.—ANDR. Bot. Rep. t. 617.

<sup>16</sup> SIMS, in Bot. Mag. t. 2624.—BOISS. Prodr.

n. 330.—*Daetylanthes globosa* HAW.

<sup>17</sup> FORSK. Fl. Æg.-Arab. 94.—VAHL, Symb. ii. 53.—BOISS. Prodr. n. 322.

<sup>18</sup> TRÉMEX, ex KL. Allgem. Ueb. d. Nill, 13.—BOISS. Prodr. n. 319.

<sup>19</sup> L. Spec. 647.—BOISS. Prodr. n. 320.

<sup>20</sup> BERG et SCHM. Darst. off. Gew. iv. t. 34 d. —COSS. sur l'*Euphorbia resinifera*, in Bull. Soc. Roy. Bot. Belg. x. 5.

<sup>21</sup> Above all are mentioned *Euphorbia patensis*, *pilosa*, and *Chamæsyce* in Europe, and in America *E. laurifolia* and *buxifolia*, which are powerful purgatives; in the East *E. aleppica*. DESLONGCHAMPS has praised *E. Gerardiana* (note 3) as a vomitive. Among the cactiform species *E. nerifolia* and *canariensis* are mentioned as powerful deobstruents. All lacteous species of *Euphorbia* have without doubt the same properties. Their action is due to a volatile principle, for warmth renders them inoffensive. Thus *E. balsamifera*, a violent purgative, becomes when cooked, a tasteless aliment. Camels eat *E. Tirucalle* cooked, which, when raw, is a powerful poison. The species of *Pedilanthus* particularly *P. tithymaloides*, *padi-folius*, *angustifolius* and *Codiaeum*, are also very active evacuates.

<sup>22</sup> *Hippomane Mancinella* L. Spec. 1431.—JACQ. Amer. 250, t. 159.—Sw. Obs. 369.—TURP. in Diet. Hist. Nat. Atl. t. 278.—A. RICH. Cuba,

the Antilles and on the continent of South America, a tree which has been the subject of a large number of fables and whose fatal effects are only felt when we bring the acrid juice, contained in the organs of vegetation, in contact with the skin or digestive organs. Men and certain animals are still oftener poisoned by the sarcocarp of its fruit, very analogous, it is said, in aspect, to a small red apple, and containing, even in a state of maturity, a certain quantity of this latex.<sup>1</sup> *Excecariu Agallocha*<sup>2</sup> (fig. 204-206), common on the seashore of the tropical countries of the old world, owes to the same properties its name of "Blinding tree." *Ophthalmoblapton macrophyllum*,<sup>3</sup> from the neighbourhood of Rio Janeiro, has the same properties. The same might be said of many species of *Excecaria* which have been designated by the name of *Sapium*, as *E. Laurocerasus*<sup>4</sup>, and *E. biglandulosa*,<sup>5</sup> from tropical America, *E. mauritiana*,<sup>6</sup> and in Asia *E. indica*,<sup>7</sup> *baccata*,<sup>8</sup> and *oppositifolia*.<sup>9</sup> The juice of some species of *Hura* is also very dangerous;<sup>10</sup> also that of *Hyænanche globosa*,<sup>11</sup> from the Cape, equally venomous in the fruit and seeds, and employed to poison ferocious animals. Many other *Euphorbiaceæ* with caustic juice are employed in America to kill game. Others are mentioned as intoxicating fish when thrown into watercourses. The

iii. 200.—H. BN. *Euphorb.* t. 6, fig. 12-20; in *Diet. Encycl. Sc. Méd. sér. ii. iv.* 481.—M. ARG. *Prodr.* 1200.—*Mancanilla* PLUM. *Gen.* 49, t. 30.—*Mancinella venenata* Tuss. *Fl. Ant.* iii. 21, t. 5. (*Noyer vénéneux, Arbre-poison, B. de mort, Figuier vénéneux.*)

<sup>1</sup> The same properties are attributed to *H. spinosa* L. (*Spec. ed. 3*, 1432;—DESCOURT. *Fl. Ant. loc. cit.*;—GUIB. *op. cit.* ii. 344, fig. 446;—*Mancinella aquifolii foliis* PLUM. *Gen.* 50; *Id.* t. 71, fig. 1;—*Sapium ilicifolium* W. *Spec.* iv. 573), a rare plant, incompletely known, and may be only a form of *H. mancinella*.

<sup>2</sup> L. *Spec.* 1451.—M. ARG. *Prodr.* 1220, n. 44.—H. BN. in *Adansonia*, vi. 324.—*E. Camettia* W. *Spec.* iv. 864.—*E. ovalis* ENDL. *Prodr. Fl. Norfolk.* 83.—*Arbor excecans* RUMPH. *Herb. Amboin.* ii. 237, t. 79, 80.—*Commia cochinchinensis* LOUR. *Fl. Cochinch.* (ed. 1790), 606.—*Stillingia Agallocha* H. BN. *Euphorb.* 518, t. 7, fig. 31-34. (*Agalloche, false Calambæ, false Calambou wood, false black Santal.*)

<sup>3</sup> ALLEM. in *Guanab.* (1844).—H. BN. *Euphorb.* 547; in *Adansonia* v. 344.—*O. brasiliense* WALP. *Ann.* iii. 362; 658 (*Santa-Lucia*).

<sup>4</sup> M. ARG. *Prodr.* 1202.—*Sapium Laurocerasus* DESF. *Cat. Hort. Par.* ed. 3, 342, 411.—*Stillingia Laurocerasus* H. BN. *Euphorb.* 513, t. 6, fi. 1-9.

<sup>5</sup> M. ARG. *Prodr.* 1204, n. 6.—*Sapium biglan-*

*dulosum* M. ARG. in *Linnaea*, xxxii. 116.—*S. prunifolium* KL.—*Stillingia biglandulosa* H. BN. in *Adansonia*, v. 320.

<sup>6</sup> *Stillingia mauritiana* H. BN. in *Adansonia*, ii. 27.—*Sapium lineatum* LAMK. *Dict.* ii. 734, n. 2.—*S. lavigatum* LAMK.—*S. obtusifolium* LAMK. (*Gluttier rayé, G. lisse.*)

<sup>7</sup> M. ARG. in *Linnaea*, xxxii. 123.—*Sapium indicum* W. *Spec.* iv. 572.—ROSENTH. *op. cit.* 822.—*S. bingyricum* ROXB. MSS.—*S. Hurmais* HAM. in *Trans. Linn. Soc.* xvii. 229.—*Tragia elliptica* HOCHST. MSS. (ex M. ARG. *Prodr.* 1216).—*Sclerocroton ellipticus* HOCHST. in *Flora* (1845), 85.—H. BN. *Euphorbiac.* t. 8, fig. 17 (*Hooroa of Bengal*).

<sup>8</sup> M. ARG. *Prodr.* 121, n. 19.—*Sapium baccatum* ROXB. *Fl. Ind.* iii. 694.—*S. hexandrum* WALL. *Cat.* n. 7965.—*S. Dacdece* WALL. *loc. cit.*—*S. populifolium* WIGHT, *Icon.* t. 1950.—*Stillingia paniculata* MIA.

<sup>9</sup> JACK, in *Cale. Journ. of Nat. Hist.* iv. 386.—M. ARG. *Prodr.* 1219, n. 40.

<sup>10</sup> See p. 163, note 6.

<sup>11</sup> LAMB. et VAHL, *Descr. Cinch. et Hyæn.* Lond. (1797), 52, t. 10.—H. BN. *Euphorb.* t. 23, fig. 29-39.—*Jatropha globosa* GÆRTN. *Fruct.* ii. 122, t. 109, fig. 3.—*Toxicodendron capense* THUNB. in *Act. Holm.* (1796), 188, t. 7.—W. *Spec.* iv. 821.

most remarkable are: in Africa, *Euphorbia piscatoria*;<sup>1</sup> in India, *Securinega Leucopyrus*;<sup>2</sup> in Guiana, *Phyllanthus brasiliensis*;<sup>3</sup> in Brazil, *Euphorbia cotinifolia*,<sup>4</sup> and *Johannesia princeps*. A very large number of these plants with acrid and venomous latex are employed in medicine in warm countries, as sudorific, depuratory, anti-syphilitic, and for gout; in the first place may be mentioned certain species of *Excavaria*, as *E. Agallocha*,<sup>5</sup> and *E. spinosa*;<sup>6</sup> numerous species of *Euphorbia*, principally among the cactiform species,<sup>7</sup> *Pedilanthus*,<sup>8</sup> certain American species of *Croton*, and especially in Brazil *C. antisiphiliticum*.<sup>9</sup> Many species of *Phyllanthus* are also depuratory, and some are, in tropical Asia, sought as powerful diuretics; the most celebrated of these are *Phyllanthus Niruri*<sup>10</sup> (fig. 251) and *urinaria*,<sup>11</sup> equally used as antisiphilitic. As the acrid latex is usually rich in caoutchoue, many of

<sup>1</sup> AIT. *Hort. Kew*, ed. 1, ii. 137.—JACQ. *Hort. schanbr.* iv. t. 485.—ROSENTH. *op. cit.* 814. (*Figura de inferno* from Madeira).

<sup>2</sup> It has also been called *Phyllanthus virosus* (W. *Spec.* iii. 578) and *Blueggia virosa* (see p. 164, note 6).

<sup>3</sup> POIR. *Diet.* v. 296, n. 2.—P. CONAMI SW. *Prodr.* 28.—H. BN. in *Adansonia*, v. 356.—P. *fruticosus* L. C. RICH. in *Act. Soc. Hist. Nat. Par.* 113.—P. *piscatorum* H. B. K. *Nov. Gen. et Spec.* ii. 113.—CONAMI *brasiliensis* AUBL. *Guian.* ii. 927, t. 354. (Conami, Bois à enivrer.)

<sup>4</sup> L. AMMAN. iii. 112.—*Alectorocroton cotinifolium* KL. et GRÆKE, *Tric.* 40.—A. *Wildenowii* KL. et GRÆKE (*Euphorbe fustet*). These are also mentioned as used to intoxicate fishes *E. hypernica*, employed in England (HCOX. *Brit. Fl.* ed. 4, 326), *E. punicea* le *Croton Tigilium*, *E. Excavaria indica*, *E. Agallocha*, etc. Fish and crabs who eat the fruit of the Manchineel are said to be poisonous.

<sup>5</sup> See p. 167, note 2.

<sup>6</sup> With *E. hypernica* and *sylvatica* it is often administered in venereal affections before mercury is used.

<sup>7</sup> Especially in India *E. pilulifera* and *parviflora* (LINDL. *Veg. Kingd.* 277). It is said that Spanish peasants use for the same purpose *Euphorbia canescens* L.

<sup>8</sup> Particularly *P. padifolius* POIR. in the Antilles and also *P. tithymaloides* and *angustifolius* POIR. (in *Ann. Mus.* xix. 390, t. 19).

<sup>9</sup> MART. in *Isis* (1824), 586; in *Linnaea* (1830), Litt. 37.—M. ARG. *Prodr.* 593, n. 208.—ROSENTH. *op. cit.* 834.—*C. perdicipes* A. S. H. *Pl. Us. Bras.* t. 59.—H. BN. in *Adansonia*, iv. 336.—*Ocailia cordifolia* KL. in *Erichs. Arch.* (1841), 195.—*O. cordifolia* KL.—*O. echifolia* KL.—*O. Sellowiana* KL. (*Pé de perdis*, *Erva mular*.)

There are employed, in America for the same purpose *C. Urucurana* H. BN. *Draco* SCHLCHTL, *draconoides* M. ARG. *salutaris* CASAR. whose juice is reddish, depuratory, and sudorific; from whence their common name of *Sangre de Drago*, Dragon's blood. *C. campestris* A. S. H. (*Pl. Us. Bras.* t. 60;—H. BN. in *Adansonia*, iv. 316;—M. ARG. *Prodr.* 632, n. 300) has analogous properties (vulg. *Velame do campo*.) *C. originifolius* LAMK. (*Diet.* ii. 205), a species from the Antilles, has, it is said, the same virtues as *Copaiba*. In North America they consider as a powerful anti-syphilitic and depuratory *E. Excavaria sylvatica* (*Stillingia sylvatica*) GARDEN, in *L. Mantiss.* 126.—MICHX. *Fl. Bor.-Amer.* ii. 213.—A. GRAY, *Man.* 391.—*Sapium linearifolium* TORR., under the name of Yaw-root. In India they prescribe for syphilis *E. Chamelea* H. BN. (in *Adansonia* vi. 324;—*Tragia Chamelea* L. *Spec.* 1391;—*Chemidostachys Chamelea* SRENG.;—ROSENTH. *op. cit.* 822;—*Microstachys Chamelea* A. JUSS.;—*Elachocroton asperococcus* F. MUELL.;—*Sebastiania Chamelea* M. ARG. *Prodr.* 1175, n. 9) and *Tragia involucreta* L.; in Brazil *Jatropha officinalis* POHL (*Pl. Bras.* i. 13; H. BN. in *Adansonia*, iv. 266;—*Adenoropium ellipticum* POHL), used also as a purgative in Sertao of Minas-Geraes. (*Raiz de Truh, R. de Lagarto*.)

<sup>10</sup> L. *Spec.* 1392.—M. ARG. *Prodr.* 406, n. 358.—ROSENTH. *op. cit.* 839.—*P. carolinianus* BLANCO.—*Nymphanthus Niruri* LOUR. *Fl. Cochinch.* 545 (*Herbe au chagrin, Erva Pombinha*). Used in Brazil for diabetes, and in India as stomachic, anti-dysenteric, tonic, diuretic, etc.

<sup>11</sup> L. *Spec.* 1323.—M. ARG. *Prodr.* 364.—*P. cantoniensis* HORNEB.—*P. alatus* BL.—*P. leprocarpus* WIGHT.—*P. echinatus* WALL.—*P. lepidocarpus* SIEB. et ZUCC.—*P. polyphyllus* WALL. (*Urinaire du Malabar*.)

of the trees which produce them are cultivated on this account, principally species of *Hevea* in Guiana and the northern provinces of Brazil. All the caoutchoucs of *Euphorbiaceæ* proceeding from these countries were formerly attributed to *H. guianensis*,<sup>1</sup> or *Siphonia elastica*; but we now know that the same substance is extracted at Para from other species of the same genus, such as *H. lutea*,<sup>2</sup> *brasiliensis*,<sup>3</sup> *ternata*,<sup>4</sup> *rigidifolia*,<sup>5</sup> *pauciflora*,<sup>6</sup> *Benthamiana*,<sup>7</sup> and *Spruceana*.<sup>8</sup> The latex flows from incisions made in the tree,<sup>9</sup> out of the rainy season, because then the juice is poor in useful materials. A horizontal gash is first made with a knife or hatchet in the trunk, some inches from the base; after which another is made, vertical and elongated, the bottom of which joins the first, and then receives shorter incisions on the right and left, oblique and descending, disposed parallel to each other like the feathers of a quill. The juice which flows from these cuts is received below in shells or earthen bowls. The trunk is sometimes compressed, to hasten the flowing, with ropes of bind-weed surrounding it crosswise. The latex, at first white and opaque like cream, slowly thickens, the deposit of caoutchouc is accelerated by the action of gentle warmth on small quantities placed in vessels of clay or even of wood. The elevation of temperature is obtained by the combustion of the fruit of the palm, placed in a brazier or in vessels with large necks, producing much smoke, which thickens, dries, and at the same time colours the product. A more modern process consists in precipitating the caoutchouc, by a solution of alum, which is then submitted to the action of a strong press.

The existence, in a large number of *Euphorbiaceæ*, of astringent

<sup>1</sup> AUBL. *Guian.* 871, t. 335 (*H. peruviana*).—M. ARG. *Prodr.* 719.—*Jatropha elastica* L. *Suppl.* 422.—*Siphonia elastica* PERS. *Syn.* ii. 588.—A. JUSS. *Euphorbiac.* t. 12.—KL. in *Hayn. Arzn.* xiv. t. 4.—S. *Cahuchiu* W. *Spec.* iv. 567.—S. *guianensis* J. ex H. BN. *Euphorb.* 326, t. 15, fig. 1-11. (*Bois de seringue, Pao seringa*.)

<sup>2</sup> SPRUCE, MSS. ex BENTH. in *Hook. Jour.* (1854), 370.—M. ARG. *Prodr.* 719, n. 7.—H. BN. in *Adansonia*, iv. 285.—S. *apiculata* H. BN. *loc. cit.*

<sup>3</sup> M. ARG. in *Linnaea*, xxxiv. 204.—*Siphonia brasiliensis* H. B. K. *Nov. Gen. et. Spec.* vii. 171.—KL. in *Hayn. Arzn. Gew.* xiv. t. 5.

<sup>4</sup> *Micrandra ternata* R. BR. in *Bonn. Pl. Jav.*

*var.* 237.—*Hevea paraensis* R. BR. MSS. (ex H. BN. in *Adansonia*, iv. 284).—*H. discolor* M. ARG. *Prodr.* n. 2.—*Siphonia discolor* BENTH. in *Hook. Journ.* (1854), 369.—S. *brasiliensis* BENTH. *loc. cit.* (nec K.).

<sup>5</sup> M. ARG. *Prodr.* 718, n. 4.—*Siphonia rigidifolia* SPRUCE, ex BENTH. *loc. cit.*

<sup>6</sup> M. ARG. *Prodr.* n. 3.—*Siphonia pauciflora* BENTH. *loc. cit.*

<sup>7</sup> M. ARG. *Linnaea*, xxxiv. 204.

<sup>8</sup> Caoutchouc is also extracted, it is said, from several species of *Micrandia* from Para (see H. BN. in *Adansonia*, iv. 286).

<sup>9</sup> COLLINS, *Rep. on the Caoutch. of Comm.* Lond (1872), 8, 36.

principles which make them tannic, tinctorial, tonic, and stomachic plants, is another proof of the little uniformity of properties which may be observed in a group otherwise perfectly natural. Species of *Phyllanthus* are very often tonic and astringent, for example, *P. Niruri*, *squamifolius* SPRENG., *retusus* DENNST., *oblongifolius*, DENNST., *Bischoffia javanica*<sup>1</sup> BL., *Myrabolans emblics*; <sup>2</sup> many Indian *Amanoa* of the section *Bridelia*,<sup>3</sup> whose bark rich in tannin, is employed; *Securinega Leucopyrus*, *Excoecaria guianensis*<sup>4</sup> (fig. 207–209) of tropical America, and especially an allied species *E. Hilariana*,<sup>5</sup> used for tanning skins; *Alchornea latifolia*<sup>6</sup> from the Antilles, employed in diseases of the digestive organs and falsely considered to produce Alcornoque bark;<sup>7</sup> many species of *Mabea*<sup>8</sup> from Brazil, having a bitter, astringent, febrifuge bark; *Trewia nudiflora*,<sup>9</sup> the bark of whose roots is prescribed in Malabar for gout and rheumatic affections; *Echinus philippinensis*,<sup>10</sup> whose roots and fruit serve for the topical treatment of contusions, pains, etc.; the Asiatic *Macaranga*,<sup>11</sup> of the section *Mappa*, rich in tannin and used for the preparation of leather; and finally *Acalypha hispida*,<sup>12</sup> whose flowers are considered in India as a specific for diarrhœa. The bitterness and astringency are combined with a large proportion of aromatic, stimulant, febrifuge principles in species of *Cascarilla*,<sup>13</sup> whose botanical history has been so long covered with obscurity, all the barks of American species of the genus *Croton*, species from the

<sup>1</sup> BL. *Bijdr.* 1168.—M. ARG. *Prodr.* 478.—*Stylodiscus trifoliatus* BENN. *Pl. Jav. Rar.* 133, t. 29.—*Microelus Raperianus* WIGHT.—*Andrachne trifoliata* ROXB.

<sup>2</sup> See p. 164, note 5.

<sup>3</sup> Particularly *B. spinosa* W. and *scandens* W. (ROSENTH. *op. cit.* 838). *A. collina* H. BN. (*Euphorb.* 582;—*Cluytia collina* ROXB. *Pl. Corom.* ii. 37, t. 69;—*Lepidicopsis orbicularis* M. ARG. *Prodr.* 509), has fruits whose pericarp is prescribed for several affections of the digestive organs; more than a small dose is said to be very poisonous.

<sup>4</sup> *Maprounea guianensis* AUBL. *Guian.* ii. 895, t. 342.—*Egopricum betulinum* L. FIL. *Suppl.* 413.—*Stilli* *ia guianensis* H. BN. *Euphorb.* 521 *Maprounea* of Guiana). The root is used for the treatment of diseases of the stomach. The leaves, tannic, dye black.

<sup>5</sup> *Stillingia Hilariana* H. BN. in *Adansonia*, v. 332.—*Maprounea brasiliensis* A. S. H. *Pl. Us. Bras.* t. 65.—M. ARG. *Prodr.* 1191.

<sup>6</sup> SW. *Prodr.* 98.—HEYN. *Arzn. Gew.* 10, t. 42.—M. ARG. *Prodr.* 908.

<sup>7</sup> See *Hist. Plants.* ii. 379, note 7.

<sup>8</sup> Especially in Guiana, *M. Piriri* AUBL. and *Taquari* AUBL. commonly called Pipe wood and Calmut wood, because these plants (which yield a little caoutchouc) have hollow branches used to make pipe stems; and in Brazil, *M. fistulifera* MART. *Reis. et in Linnaea* (1830), 39.—*M. ferruginea* BENTH. (*Caecudo de Pito*), used for the treatment of fevers and stomach complaints.

<sup>9</sup> L. *Spec. ed.* 3, App. 1661.—M. ARG. *Prodr.* 953.—*T. macrophylla* ROTII.—*Tetragastris ossea* GERTN. *Fruct.* ii. 130, t. 109.—*Rottlera Hopeiriana* BL.—*Canschi* RHEED. *Hort. Malab.* i. 76, t. 42.

<sup>10</sup> See p. 164, note 8.

<sup>11</sup> Principally *M. Tanarius* (M. ARG. *Prodr.* 997, n. 25;—*Mappa tanarius* BL. *Bijdr.* 624;—*M. tomentosa* BL.;—*M. moluccana* BENTH.;—*M. glabra* A. JUSS.;—*Ricinus Tanarius* L.;—*Croton lacciferus* BLANCO, nec L.).

<sup>12</sup> BURM. *Fl. Ind.* 303, t. 61, fig. 1 (nec W.).—M. ARG. *Prodr.* 815, n. 38.—*Caturus spiciflorus* ROXB. *Fl. Ind.* iii. 760.

<sup>13</sup> GUIB. *op. cit.* ii. 361.—H. BN. in *Dict. Eucel. Sc. Méd.* xii. 756.

Antilles, and especially from the Bahamas. LINNÆUS had confounded, under the name of *C. Cascarilla*, two perfectly distinct species. One is, according to BENNETT,<sup>1</sup> the true *C. Cascarilla*<sup>2</sup> and comes from the Bahamas. The other, yielding a product of secondary quality, is not only found in these islands, but particularly in Cuba, and St. Domingo; it is the *C. lineare*.<sup>3</sup> *C. Eluteria*,<sup>4</sup> a Bahama species, yields actually *C. officinalis*, or *Chacril*, Eleutherian bark, whilst *C. Cascarilla* only furnishes an insignificant quantity, contrary to what was formerly the case. *C. flavens*,<sup>5</sup> or *C. balsamiferum* from Martinique, a species whose leaves are nearly the same as *Salvia*, furnish a sort of cascarilla, whose properties are analogous to those of *C. officinalis*; but it never comes now to Europe. *C. lucidum*<sup>6</sup> yields in Cuba the false Cascarilla of Bahama, and *C. niveus*,<sup>7</sup> the Cascarilla of the Trinity, of Cuba, or *Copalchi*. The Cascarilla barks were at first praised as substitutes for cinchona; but their febrifuge action seems to be very slight; they are especially known as tonic, aperient, and antichlorotic. Their use is recommended in cases of diarrhœa of long standing, and they are employed in veterinary medicine to quicken the secretion of milk. Many other species of Croton have stimulant properties; owing to being, like Cascarilla, rich in essences whose odour and virtues much resemble those observed in *Labiata*. *C. gratissimus*<sup>8</sup> from the Cape, furnishes a choice perfume. On the borders of the Amazon, *C. adipatus*<sup>9</sup> and *thurifer*<sup>10</sup> yield a sort of incense. In the Antilles, *C. humilis* is used to prepare aromatic baths. In Martinique, what is called Eau de Mantes

<sup>1</sup> In *Journ. Linn. Soc.* iv. 30.

<sup>2</sup> L. *Spec.* ed. 3, 1424 (part.).—M. ARG. *Prodr.* 616, n. 260.—DANIELL, *On the Cascarilla and other Spec.* . . . in *Pharm. Journ.* ser. 2, iv. 144, 226, t. 3, fig. 1 (nec LAMK.).—*C. cascarilloides* GEISEL. *Mon.* 8 (part.).—*Clusia Cascarilla* L. *Spec.* 1042 (part.).

<sup>3</sup> JACQ. *Amer.* 257, t. 162, fig. 4.—LAMK. *Dict.* ii. 204.—*C. hippophaeoides* A. RICH. *Cub.* iii. 212.—*Clusia Cascarilla* L. *Amœn.* v. 411. Distinct from that Species which bears the same name (vulg. *Sauge du Port de la Paix*).

<sup>4</sup> BENN. *loc. cit.* 29.—DANIELL, *loc. cit.* 4, t. 1.—M. ARG. *Prodr.* n. 8.—*Clusia Eluteria*, L. *Spec.* 1042 (part.).

<sup>5</sup> L. *Amœn.* v. 410.—M. ARG. *Prodr.* n. 253.—*C. balsamifer* JACQ.—*C. Richardi* W.—*C. mucronatus* W.—*C. tomentosus* LINK.—*C. padifolius* GEIS.—*C. flocculosus* GEIS.—*C. astroites* W.—*C. leprosus* SPRENG.—*C. Cascarilla* LAMK. *Dict.* ii.

203 (nec L.). Those stalks yield a balsamic juice, with a slightly acid and bitter taste (see H. BN. in *Diet. Encycl. Sc. Méd.* xii. 757, n. 5.)

<sup>6</sup> L. *Amœn.* v. 410.—*C. pallens* SW.—*C. spicatus* BERG.—*C. glanduliferus* VAHL. *C. (Astrap.) Hookerianus* H. BN. (*Euphorbiac.* 363) is a simple form.

<sup>7</sup> JACQ. *Amer.* 255, t. 162, fig. 2.—*C. Syringæ-folius* H. B. K.—*C. Pseudo-China* SCHLCHTL. in *Linnaea*, iv. 84.—LIND. *Fl. Med.* 180, n. 362.—ROSENTH. *op. cit.* 833.—GUIB. *op. cit.* ii. 364. Humboldt formerly wrongly attributed the origin of *Copalchi* to *C. suberosus* H. B. K.

<sup>8</sup> BURCH. *Trav.* ii. 268.—SOND. in *Linnaea*, xxiii. 149.—ROSENTH. *op. cit.* 835.—H. BN. in *Adansonia*, iii. 154.

<sup>9</sup> H. B. K. *Nov. Gen. et Spéc.* ii. 68.—M. ARG. *Prodr.* n. 97.

<sup>10</sup> H. B. K. *op. cit.* ii. 76 (*Ullucina*).

owes its perfume to *C. flavens*. *C. anisatus*<sup>1</sup> of Madagascar has, in the dry specimens, the exact odour of *Illicium anisatum*. The leaves of *C. Caryophyllus* have, it is said, the odour of *Cheiranthus*; those of *C. fragrans*,<sup>3</sup> *menthodorum*<sup>4</sup> and *balsameum*,<sup>5</sup> American species, are very aromatic. *C. glabellus*,<sup>6</sup> from the Antilles, has a perfumed bark, like *C. Eluteria*, for which it is said to be substituted. *C. vulnerarius*<sup>7</sup> and *C. celtidifolius*<sup>8</sup> are also stimulant and vulnerary. The last especially owes its properties to a reddish juice found in a good number of American species, sometimes employed for the treatment of wounds and contusions, as *C. abutiloides*,<sup>9</sup> *gossypifolius*,<sup>10</sup> *Urucurana*,<sup>11</sup> and *Draco*,<sup>12</sup> aromatic plants, whose concreted juice is compared for its properties to Dragon's-blood. *C. Malambo*<sup>13</sup> owes its name to its furnishing Melambo bark, aromatic, camphorate, analogous to that of *Drimys*, *Boldu* and *Atherosperma*, stimulant, digestive, febrifuge and strengthening. In certain aromatic species of India, the nature of the juice is modified by the influence of the punctures of insects. It is believed that it is owing to the action of *Coccus Lacca* on its branches that the *C. aromaticum*<sup>14</sup> of India yields the gum-lac, employed in medicine and the arts. The number of species of *Croton* with odoriferous juice, balsamic or resinous, tonic or exciting, is considerable in the tropical regions of the world.<sup>15</sup> Others have very variable properties, hardly explicable, and there are many *Euphorbiaceæ* of other genera the same. Thus, *Euphorbia Schimperiana*<sup>16</sup> and *cerebrina*,<sup>17</sup> are mentioned as dyes; and in their native country, Abyssinia, they value *Croton macrostachyus*<sup>18</sup> as

<sup>1</sup> H. BN. in *Adansonia*, i. 159.

<sup>2</sup> BENTH. in *Hook. Journ.* (1854), 374.

<sup>3</sup> H. B. K. *op. cit.* ii. 81.

<sup>4</sup> L. AMEN. v. 409.—GEIS. *Mon.* 40 (part.).—*C. Eluteria* SW. (nec. BENN.).—*C. nitens* SW.—*C. squamulosus* VAHL.—*Clusia Eluteria* L. *Amæn.* v. 411 (nec. *Spec.*).

<sup>5</sup> BENTH. *Pl. Hartweg.* 248.

<sup>6</sup> M. ARG. in *Linnaea*, xxxiv. 107.

<sup>7</sup> H. BN. in *Adansonia*, iv. 328.

<sup>8</sup> H. BN. in *Adansonia*, iv. 331.—*C. sanguis Draconis* MART. MSS.—*C. cynanchicum* H. BN. *loc. cit.* 329.

<sup>9</sup> H. B. K. *Nov. Gen. et Spec.* ii. 86.

<sup>10</sup> VAHL, *Symb.* ii. 98.—*C. hibiscifolius*, H. B. K. *op. cit.* ii. 89.

<sup>11</sup> H. BN. in *Adansonia*, iv. 335 (*Dragon's blood*).

<sup>12</sup> SCHLICHTL. in *Linnaea*, vi. 380.—*Cyclostigma Draco* KL. (*Sangue de Drago*).

<sup>13</sup> KÆST. in *Linnaea*, xxvii. 418; *Fl. Columb.* 25, t. 13.—GUIB. *op. cit.* ii. 365.

<sup>14</sup> L. *Spec.* 1005 (nec W.).—GEIS. *Mon.* 24 (part.).—*C. lacciferus* GÆRTN. *Fruct.* ii. t. 107 (nec L.). *C. aromaticus* W. is an allied species, but different (*C. lacciferus*, L.), also giving the same products. It is the plant represented by BURMANN, *Thes. Zeyl.* 201, t. 91), under the name of *Ricinioides*, etc.

<sup>15</sup> SEC ROSENTH. *op. cit.* 833-837.

<sup>16</sup> HOCHST. in *Ers. Schimp.*—A. RICH. *F. Abyss. Tent.* ii. 242.—BOISS. *Prodr.* n. 615.

<sup>17</sup> HOCHST. *loc. cit.*—*Tithymalus cecrinus* KL. et GRÆKE, *Tric.* 86.—*E. Petitiiana* A. RICH. *loc. cit.* 241.—E. FOURN. *The tenifuges... Abyss.* 29. The same author mentions besides his *E. Handoukdouk* and *E. depauperata* HOCHST.

<sup>18</sup> A. RICH. *Fl. Abyss. Tent.* ii. 251.—E. FOURN. *loc. cit.* 57.—*Rottlera Schimperii* HOCHST. et STEUD. (*Tambuch*).



such. *Euphorbia hypericifolia*<sup>1</sup> shares in Columbia the name of *Canchalagua* with certain bitter and depurative *Gentianaceæ*, of which it appears to possess the properties. In certain countries of South America it is considered as slightly narcotic, elsewhere its juice is employed to extract spots on the cornea. The juice of *E. Chamæsyce*<sup>2</sup> is used for itch and as a sudorific. In Brazil *E. pilulifera*<sup>3</sup> is believed to be good for curing the bites of serpents; the juice is used for the treatment of aphthæ. *E. officinarum*,<sup>4</sup> employed in Morocco for tanning leather, is at the same time an insecticide and antirheumatic. There have also been proposed as remedies for rabies *E. pilosa*<sup>5</sup> of Russia and *Mercurialis tomentosa* of the south of Europe.<sup>6</sup>

Very few of the *Euphorbiaceæ* are edible, with the exception of those whose fruits and seeds we have mentioned as being eaten. Still the shoots of several species of *Euphorbia*, as *E. balsamifera* of Africa, are eaten when cooked. *E. edulis*<sup>7</sup> is especially mentioned, LOUREIRO has seen it eaten by the Cochinchinese; species of *Mercurialis*, of which the peasants are said sometimes to eat the young leaves; species of *Plukenetia* of India, particularly *P. volubilis*,<sup>8</sup> from which a delicate dish is prepared by cooking them in the milk of the cocoa-nut; and finally *Manihot*, whose leaves, minced and cooked in oil, are sometimes eaten by the South Americans. But the most celebrated aliment of this family is the fecula extracted from the roots of certain species of the latter genus, bearing the names of *Cassava*, *Moussache*, *Conaque*, *Tapioca* and *Manioc*.<sup>9</sup> It is furnished principally by *M. amer* (Fr.) or *Manihot edulis* of Plumier,<sup>10</sup> cultivated in most tropical countries, and by *M. doux* (Fr.) or *Camagnoc*,<sup>11</sup>

<sup>1</sup> L. Hort. Cliff. 198.—HOOK. Exot. Fl. i. t. 36.—BOISS. Prodr. n. 51.

<sup>2</sup> L. Amœn. iii. 115.—BOISS. Prodr. n. 101.—*B. massiliensis* DC. Fl. fr. v. 357.

<sup>3</sup> L. Amœn. iii. 114.—BOISS. Prodr. n. 43.—*E. capitata* LAMK. Dict. ii. 422.

<sup>4</sup> L. Spec. 647.—*E. polygonatum* ISN. in Act. Acad. Sc. Par. (1722), 387, t. 10.

<sup>5</sup> L. Spec. 659.—*E. procera* BIEB.—*E. villosa* WALDST. et KIT.—*E. illyrica* LAMK. Dict. ii. 435.—*E. paniculata* LOIS.

<sup>6</sup> A peculiar property is mentioned, that of being phosphorescent in the dark, in a Brazilian species, *E. phosphorea* MART. (Reis. 726; in *Linnaea* [1820], Litt. 612.—BOISS. Prodr. n. 697).

<sup>7</sup> LOUR. Fl. Cochinch. (ed. 1790), 298 (*Xuong raong lu*).—BOISS. Prodr. n. 294.

<sup>8</sup> L. Spec. 1192 (part.).—LAMK. Ill. t. 788.—PLUM. Nov. Pl. Amer. t. 13, fig. 2.—ROSENTH. op. cit. 822. In the Moluccas, *P. corniculata* SM. is cultivated as a pot herb. It is employed topically in the treatment of cedema, abscesses, &c. (*Sajor Putj*).

<sup>9</sup> ENDL. *Enchirid.* 595.—GUID. op. cit. ii. 347.—PEREIRA, *Elem. Mat. Med.* ed. 4, ii. p. i. 428.—H. BN. in Dict. *Encycl. Sc. Méd.* sér. ii. iv. 561.

<sup>10</sup> *M. utilisissima* POHL. Pl. bras. i. 32, t. 24.—M. ARG. Prodr. 1064, n. 17.—*M. edule* A. RICH. Cub. iii. 208.—*Jatropha Manihot* L. Spec. 1007.—TUSS. Fl. Ant. iii. t. 1.—DESCOURT. Fl. Ant. iii. t. 176.—*Janipha Manihot* H. B. K. Nov. Gen. et Spec. ii. 108.—Bot. Mag. t. 3071. (*Mandijba*, *Mandiocca*, *Juca amarya*).

<sup>11</sup> *M. Palmata* M. ARG. Prodr. 1062, n. 16.—*M. diffusa* POHL.—*M. Aipi* POHL.—*M.*

which we have proposed calling *M. dulcis* or *mitis*, although it has received a great many other names. The latter is especially cultivated in America, where it is grown generally, like the former, from cuttings. They develop fleshy roots (?) underground, more or less fusiform, sometimes very large, whose form recalls that of our Dahlias. Those of *M. doux*, it is said, only contain fecula, and may be eaten cooked in water or under embers; animals may eat them raw without danger. But in *M. amer* there is also a very deleterious and very volatile juice, which may be got rid of by heat or the action of water. The roots are rasped and furnish a pulp which is enclosed in a long bag, woven with the leaves or fibres of the Palm, having a weight suspended at the end whose traction squeezes out the dangerous juice mixed with the pulp; after which this bag, placed near the fire, soon contains only a dry powder or manioc flour. Now, an ordinary press is used to extract the juice. Tapioca is this same substance prepared in hard or slightly elastic lumps, formed of very small spherical grains, and changing into a viscid and transparent starch under the influence of boiling water. In cassava, it is spread out in thin cakes, dried on a heated iron plate. This fecula is used by the Galibis to prepare several fermented drinks. Perhaps alcohol might be extracted from it for economic use. Commerce also finds among the *Euphorbiaceæ* two products of considerable importance; a vegetable wax, furnished by the Tallow tree,<sup>1</sup> filling all the exterior coat of the seed; and an oil, called wood oil, extracted in China from the inner parts of the seeds of *Aleurites cordata*<sup>2</sup> (fig. 170, 171) used for burning, for making very useful varnishes, to coat wood to protect it from the action of damp, for rendering stuffs waterproof, and for a multitude of domestic purposes. The wood of the *Euphorbiaceæ* is generally but slightly enduring. Still *Securinega durissimu*<sup>3</sup> bears in the Mascarene islands the name of hard wood and hatchet wood. *Excæcaria lanceolata*,<sup>4</sup> from Brazil, is a good building wood; in Australia, that

*Laëtingii* GRAH.—*M. Grahami* HOOK. Icon. t. 530.—*M. pusilla* POHL.—*Jatropha dulcis* GMEL. *Onomat.* v. 7.—H. BN. in *Diet. Eneycl. Sc. Méd.* loc. cit. 562.—*J. mitis* ROTTB. *Surin. Descr.* 21.—*J. Palmata* VELLOZ. *Fl. Flum.* x. t. 81. (*Aipi, Juca dulcer.*)

<sup>1</sup> *Excæcaria sebifera* M. ARG. (see p. 167, note 2).

<sup>2</sup> M. ARG. *Prodr.* 724, n. 2.—*Dryandra cordata* THUNB. *Fl. Jap.* 267, t. 27.—D.

*Vernicia* CORR. in *Ann. Mus.* viii. 69, t. 32.—*Elæococca Vernicia* SPRENG.—*E. cordata* BL.—*E. verrucosa* A. JUSS.—*Vernicia montana* LOUR.—*Aleurites Vernicia* HASSK.—*Abrasin* KEMPF. *Amœn. Erot.* 789, (*Oil or Varnish tree, Wutlung* of the Japanese).

<sup>3</sup> EMEL. *Syst.* ii 4008.—*S. nitida* W. *Spec. iv.* 761.—A. JUSS. *Euphorbiac.* t. 2, fig. 4.—H. BN. *Euphorbiac.* t. 26, fig. 33-38.

<sup>4</sup> *Actinostemon lanceolatum* SALDANH. in *Adan-*

of *Actephila grandifolia*<sup>1</sup> and *Moreana*.<sup>2</sup> On all the tropical shores of Asia and Oceania grows *Excavaria Agallocha* (fig. 204-206), this tree is most poisonous, it yields the false Aloe-wood or Calambac of commerce. It is reddish brown, marbled grey or black, hard, heavy, fragile, unctuous or resinous, very bitter, aromatic, with the odour of myrrh or anise. It burns easily, giving out an agreeable perfume; it was formerly often sent to Europe as true Eagle-wood or *Agallochum*. The Manchinel has a moderately hard wood, taking a beautiful polish; it makes handsome furniture. That of *Hura crepitans*, softer, is used to form joists. That of *Jatropha Curcas* is soft, easily decaying; palisades are however made of it in the Indies. The plant is used for hedge rows in the Antilles. The cactiform species of *Euphorbia* are often excellent for this purpose, on account of their numerous thorns. *E. neriifolia* is thus employed in Cochin-China; in India, *E. Tirucalli*. Hedges of *E. myrtillifolia*,<sup>3</sup> a species from the Antilles, are difficult to break through on account of the caustic juice it exudes. The apetalous species of *Jatropha* of the section *Cnidioscolus*<sup>4</sup> are terrible for another reason. The burning hairs that cover them enter the skin and cause terrible pain. *Platygyne urens*<sup>5</sup> and *Tragia volubilis*,<sup>6</sup> *pungens*<sup>7</sup> and *involuta*,<sup>8</sup> also have urticate hairs, which render them formidable. There are few ornamental *Euphorbiaceæ*. The cactiform species are sought for by admirers of fleshy plants, and a large number are cultivated in our greenhouses. The variegated species of *Codiaeum*, used in Cochin-China to decorate buildings on holidays, have produced in Europe a multitude of varieties, the leaves spotted with yellow or red, which adorn our hothouses.<sup>9</sup> The species of *Euphorbia*, with coloured bracts, are

*sonia*, viii. 263; *Configur.*.... *Veg. Secul.* p. ii. 63, t. 11. (*Canella de veadó*.)

<sup>1</sup> H. Bn. in *Adansonia*, vi. 330, 360, t. 10.—*Lithorylon grandifolium* M. ARG. *Prodr.* 232.

<sup>2</sup> H. Bn. *loc. cit.* 330, 366.

<sup>3</sup> L. *Syst.* ii. n. 38.—BOISS. *Prodr.* n. 116.—*E. myrtifolia*. L. *Spec.* n. 30.—*E. emarginata* LAMK. *Diet.* ii. 426.

<sup>4</sup> Particularly *J. urens* L. (*J. stimulosa* MICHX.), *hamosa* M. ARG. (*Cnidioscolus hamosus* POHL), *vitifolia* MILL. *horrida* M. ARG. whose fruits also bristle with very formidable hairs. Many have, however, napiform and edible tubercles.

<sup>5</sup> See p. 215, note 4.

<sup>6</sup> L. *Spec.* 980.—SW. *Obs.* 353.—*T. pedun-*

*culata* P. BEAUV. *Fl. Or. et Ben.* i. 90, t. 54.—*T. diffusa* VELLOZ. *Fl. Flum.* x. t. 10.—*T. monandra* H. Bn. (*Liane brûlante*). Its juice, with marine salt, is used in America to treat ulcers, the yaw, etc.

<sup>7</sup> M. ARG. *Prodr.* 941.—*T. cordata* VAHL. *Symb.* i. 176.—W. *Spec.* iv. 322.—*Jatropha pungens* FORSK. *Æg.-Ar.* 163.

<sup>8</sup> JACQ.  *Ic. Rar.* t. 198.—BOJ. *Hort. Maur.* 286.—*Schorigeram* RHEEDE, *Hort. Malab.* ii. 72, t. 39. In India this species is often given as a remedy to those affected with syphilitic cachexy.

<sup>9</sup> Certain species of *Euphorbia* and *Acalypha*, with variegated foliage are also sought for.

employed for the same purpose as *E. pulcherrima*,<sup>1</sup> the species of *Dalechampia* with petaloid involucre,<sup>2</sup> and of *Euphorbia* with white streaked leaves. The magnificent leaves of certain species of *Macaranga* and *Curatubium*, those sometimes so delicate of several species of *Phyllanthus*, which are simple, and whose branches always imitate compound leaves, those again of our beautiful varieties of *Ricinus*, make of all these species very ornamental plants. By their leaf-shaped cladodes, the species of *Phyllanthus* of the section *Xyllophylla* are of the number of plants which, in our greenhouses, excite most curiosity.

<sup>1</sup> W. Herb. n. 9259.—*E. Coccinea* W.—*E. diversifolia* W.—*E. erythrophylla* BERTOL.—*Pleuradenia coccinea* RAFIN.—*Poinsettia pulcherrima* GRAM. in *Edinb. new Phil. Journ.* (March, 1836); in *B t. Mag.* t. 3493. The bracts are yellow, more often red, and are used for dyeing. In *E. fulgens* KARW. more often cultivated under the name of *E. jacquiniaefolia* (HOOK. in

*Bot. Mag.* t. 3673), the part coloured red is the perianth.

<sup>2</sup> Principally *D. Raziana* (M. ARO. *Prodr.* 1223, n. 2), which is probably only a variety, with bracts frequently coloured, of *D. (Cremophyllum) spatulata* H. BS. (*Et. Gen. Euphorbiac.* 58, t. 3, fig. 16-30).

## GENERA.

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### I. EUPHORBIACEÆ.

1 **Euphorbia** L.—Flowers hermaphrodite or more rarely polygamous; calyx lobes of subcampanulate or subturbinate calyx 5 (rarely 4–8) membranous imbricated, alternating with the same number of glands, sometimes outwardly accrescent with petaloid appendage. Stamens  $\infty$ , or rarely sub-definite, in series the same in number as calyx lobes and opposite to them; filaments in each series 2-seriate, very unequal, and more or less high, transversely articulate, more or less outwardly adnate to perianth; anthers 2-locular, rimose. Glands  $\infty$ , sometimes small or 0, often bractiform, ciliate-lacerate, alternating with series of stamens. Germen central long stipulate; stipes generally elongated, recurved and incrassate below germen in hypogynous disk, 3–6-lobed or entire, often 0. Cells 3, 1-ovulate; style afterwards divided into 2-fid branches; lobes stigmatiferous at apex and inwardly; micropyle of descendent anatropous ovule, extrorse superior, capped by piliform or sub-conical obturator springing from placenta above ovule. Fruit capsular, usually 3-coccous; cocci smooth or verrucose, solute from persistent central columella, finally elastically 2-valved; exocarp sometimes to maturity subfleshy, finally dry. Seeds smooth, rugose, or tuberculate fossulate; testa crustaceous, outwardly clothed with thin coat, carunculate, incrassate as an aril round exostome; albumen fleshy, oily, usually copious; cotyledons of straight embryo linear, or more or less ovate; radicle terete superior.—Herbaceous frutescent plants or trees sometimes fleshy (cactiform) spinescent; juice white, more rarely yellow or hyaline; leaves alternate or opposite, rarely verticillate, equal at base, sometimes small or 0; stipules lateral or 0; flowers in axillary or terminal cymes; 2–5-parous, or more rarely 1-lateral, sometimes umbelliform or capituliform; branches of inflorescence and calyx sometimes bracteolate. (*All regions.*) See p. 105.

2. **Pedilanthus** NECK.<sup>1</sup>—Flowers nearly of *Euphorbia*; perianth irregular, usually oblique, calciform (*Eupedilanthus*),<sup>2</sup> accrescent at back, with lobe-shaped appendage entire or 2-fid, more rarely (*Cubanthus*),<sup>3</sup> subequal-urceolate and accrescent at back, in shield-shaped appendage, sometimes 2-lobed at back (*Calceolistrum*).<sup>4</sup> Glands at the bottom of the appendage 2-6, or more rarely 0. Generative organs and other characters as in *Euphorbia*; stipes of germen extrorsely declinate. Fruit capsular, seeds exarillate.—Fleshy shrubs; leaves alternate; stipules small, glanduliform, or 0; inflorescence<sup>5</sup> and other characters of *Euphorbia*.—(*Trop. America*).<sup>6</sup>

## II. RICINÆ.

3. **Ricinus** T.—Flowers monœcious apetalous; calyx 5-partite, finally valvate. Stamens in male flower  $\infty$ , inserted on rather convex receptacle; filaments  $\infty$ , ramified, many times divided above; anthers small 2-dymo-globose; cells laterally or extrorsely rimose, longitudinally adnate to thin connective. Germen (in male flower 0), 3-locular subsessile; style branches 3, afterwards beyond middle 2-partite, within and on all sides much papillose stigmatiferous (red). Ovules in cells solitary descendent; micropyle extrorse superior; obturator thick subhemispherical. Capsule 3-locular; exocarp finally solute, externally smooth or echinate; cocci solute from axis. Seeds smooth (more or less spotted); aril of exostome depressed, conical, obscurely 2-lobed; cotyledons of large embryo foliaceous, subelliptical, equal in breadth to albumen—Arborescent or tall herbaceous plants; leaves alternate stipulate; petiole long at ventral line, bearing glanduliform tubercles; limb wide, usually peltate, palmatinerved, 7-15-lobed, unequally dentate; flowers in terminal, contracto-ramified cymiferous racemes; female superior; inferior male, 1-bracteate and 2-bracteolate; pedicels articulate. (*All warm regions.*) See p. 109.

<sup>1</sup> *Elem.* ii. 354.—A. JUSS. *Euphorbiac.* 59.—ENDL. *Gen.* n. 5765.—H. BN. *Euphorbiac.* 56, 287, t. 3, fig. 1-15.—BOISS. *Prodr.* 4, 1261.—*Tithymaloides* T. *Inst.* 654.—*Crepidaria* HAW. *Syn. succ.* 67.—*Hexadenia* KL. et GRÆKE, *Trioccc.* 19.—*Diadenaria* KL. et GRÆKE, *loc. cit.*

<sup>2</sup> BOISS. *loc. cit.* 4, sect. i.

<sup>3</sup> BOISS. *loc. cit.* 7, sect. iii.

<sup>4</sup> BOISS. *loc. cit.* 1261, sect. ii.

<sup>5</sup> Flowers often red sometimes spotted with red and green, or violet.

<sup>6</sup> Spec. about 18. SPRENG. *Syst.* iii. 802.—POIT. in *Ann. Mus.* xix. 388, t. 19.—BENTH. *Salph.* 40, t. 23; in *Hock. Journ.* vi. 321.—KL. et GRÆKE, *Trioccc.* 106.—GRISEB. in *Mem. Am. Ac.* (1860), 161. H. BN. in *Adansonia*, i. 340.

4. **Homonoya** LOUR.<sup>1</sup>—Flowers (nearly of *Ricinus*) monœcious or diœcious; male calyx 3-partite, valvate. Stamens  $\infty$ , polyadelphous (of *Ricinus*); more interior filaments antherless; cells of subglobose anthers confluent, shortly rimose. Calyx of female flowers 5 partite, imbricated. Germen 2-4, oftener 3-locular;<sup>2</sup> style branches same in number, simple, densely papillose. Germen and ovule, as in *Ricinus*. Capsule small; seeds smooth membranous-arillate. — Virgate-ramose shrubs; leaves alternate sessile or petiolate, 2-stipulate penninerved entire or dentate coriaceous; inflorescence spicate or racemose axillary, sometimes 2-sexual, floriferous at base, not ramified; bracts usually 1-flowered. (*South West. Trop. Asia, cont. and ins.*<sup>3</sup>)

5. **Cœlodiscus**, H. BN.<sup>4</sup>—Flowers diœcious apetalous; male calyx 4-5-partite, valvate. Stamens  $\infty$ , round central concave glandular disk; filaments more or less high polyadelphous; anthers introrse, 2-rimose. Female calyx 3-5-fid, hence deeply open. Germen 3-5-ocular; cells 1-ovulate; styles 3-5, simple, stigmatiferous within. Fruit ...? Trees (?) or shrubs;<sup>5</sup> leaves alternate or opposite, palmate-3-nerved petiolate exstipulate (?); flowers in axillary racemes, 1, 2-sexual, glomerulate or cymulose. (*Eastern India.*<sup>6</sup>)

### III. JATROPHEÆ.

6. **Jatropha** L.—Flowers monœcious or more rarely diœcious, generally 5-merous; calyx imbricated. Petals imbricated, free or connate in gamopetalous corolla, discrete, imbricated or contorted more rarely 0. Glands of disk alternipetalous, free or connate in orbicular disk. Stamens generally 10, 2-verticillate, or more rarely 11-30, 3-6-verticillate; filaments more less high connate in central column, more rarely inserted round minute rudiment of gynœceum; exterior 5, oppositipetalous; anthers 2-locular introrse

<sup>1</sup> *Fl. Cochinch.* (ed. 1790), 636.—ENDL. *Gen.* n. 5885.—M. ARG. in *Linnaea*, xxxiv. 200; *Prodr.* 1022.—*Spathiostemon* BL. *Bijdr.* 621.—ENDL. *Gen.* n. 5810.—H. BN. *Euphorb.* 292.—*Lumajang* BLANCO, *Fl. Filip.* 821.—*Hematospermum* WALL. *Cat.* n. 7953.—LINDL. *Nat. Syst.* 116.

<sup>2</sup> Anterior cells, 2.

<sup>3</sup> Spec. about 3. GEIS. *Crot. Mon.* 6 (*Croton*).—

ROTH Nov. *Pl. Sp.* 375 (*Adelia*).—WIGHT, *Icon.* t. 1868, 1869 (*Adelia*).—HASSK. *Hort. Bog.* 237, 264 (*Ricinus*).—Miq. *Fl. Ind.-Bat.* Suppl. i. 452 (*Spathiostemon*).

<sup>4</sup> *Euphorb.* 293.—M. ARG. *Prodr.* 758.

<sup>5</sup> Habit of *Echinus*.

<sup>6</sup> Spec. 3. WALL. *Cat.* n. 7723 (*Croton*), 7728 (*Ricinus*).—M. ARG. in *Linnaea*, xxxiv. 154.

or partly laterally rimose; interior sometimes effete or abortive. Germen 3-locular (more rarely 2- or 4-locular); ovule in cells solitary; obturator usually thick; style branches generally at apex stigmatiferous, 1- or 2-fid. Stamynodes hypogynous, sometimes 3-10 interior to disk. Fruit capsular sometimes subfleshy at maturity, or very rarely fleshy; cocci generally solute from columella and dehiscent. Seeds usually smooth; micropyle arillate; cotyledons of richly albuminous embryo foliaceous palmatinerved. Shrubs or small trees sometimes urent-setose; leaves alternate petiolate, 2-stipulate, entire, dentate or lobed, peminerved or oftener digitinerved; flowers usually in compound-cymiferous racemes; female flowers central; male more numerous peripheric. (*Warm reg. of America, Asia, and Africa.*) See p. 112.

7. **Manihot** PLUM.<sup>1</sup>—Flowers monœcious apetalous (nearly of *Cnidioscolus*); male calyx more or less deeply 5-fid, quincuncially imbricated. Stamens 10, 2-seriate; filaments free, slender, inserted between the marginal teeth or lobes of thick fleshy-glandular wide disk; anthers dorsally affixed; cells lateral or oftener (in shorter stamens alternating with leaves of calyx) more or less extrorse, longitudinally rimose. Female calyx 5-fid or oftener 5-partite deciduous. Disk hypogynous, thick, subannular, often furnished outwardly with 10 very short staminodes. Germen 3-locular; ovules solitary in cells descendent; micropyle extrorse superior; obturator thick; <sup>2</sup> style afterwards divided into 3 thick lobes, shortly repeatedly 2-lobed, papillose, undulate. Fruit capsular, 5-coccous; cocci 2-valved; exocarp usually solute; seeds of *Jatropha*; micropyle thick, arillate.—Herbs, undershrubs, or more rarely trees; root (?) sometimes tuberosc; often glabrous glaucescent; abounding in a hyaline juice; leaves alternate (of *Jatropha*), simple or digitate-compound; stipules usually small, deciduous flowers in simple or ramified racemes sometimes cymiferous, often terminal; female

<sup>1</sup> *Cat.* 20 (part.).—T. *Inst.* 658, t. 438.—ADANS. *Fam. des Pl.* ii. 356.—ENDL. *Gen. n.* 8508.—H. BN. *Euphorb.* 305, t. 19, fig. 12-17.—M. ANG. *Prodr.* 1057.—Camaguac AUBL. *Guian.* iii. *Trois Mém.* 65.—Janipha H. B. K. *Nov. Gen. et Spéc.* ii. 106, t. 169.—A. JUSS. *Euphorb.* 37, t. 10, fig. 33.—Aypi C. BAUH. *Pin.* 91.

<sup>2</sup> Usually coloured bluish or purplish, some-

times with pale purple stripe.

<sup>3</sup> In the centre, at an early age, an abortive germen may be seen.

<sup>4</sup> An elongated process is present, rising from the top of the nut, and more or less compressed at the apex or spatulate attached to the back of the obturator (sometimes taken for a middle lobe of the obturator itself).



usually few, inferior in raceme, or central in small cyme; others male, all sometimes largely bracteate. (*Warm America*.<sup>1</sup>)

8 ? **Tannodia** H. BN.<sup>2</sup>—Flowers (nearly of *Jatropha*) monœcious; male calyx 5-partite, valvate. Petals 5, alternate, imbricated. Stamens 10, 2-seriate verticillate; filaments connate at base, and surrounded by 5 alternipetalous glands, afterwards free; anthers rimose, 2-locular; the oppositipetalous shorter introrse; the alternipetalous extrorse. Female calyx 5-dentate, imbricated. Petals 5, alternate. Disk hypogynous, membranous urceolate. Germen 3-locular; ovules solitary; micropyle extrorse superior; obturator rather thick; style branches 3, short, reflexed, 2-fid. Fruit (?)—A glabrous shrub; leaves alternate petiolate, 2-stipulate, entire penninerved; flowers in spike-shaped racemes; bracts 2-glandular cymose-3-flowered.<sup>3</sup> (*Malacassia*.<sup>4</sup>)

9. **Tournesolia** Scop.<sup>5</sup>—Flowers nearly of *Jatropha*,<sup>6</sup> often monœcious, more rarely diœcious; receptacle convex, or sometimes slightly concave (an insertion whence perianth and disk are subperigynous). Male calyx 5- or more rarely 3, 4-partite, valvate or reduplicate. Petals same in number alternate, finally valvate, more or less evolute, sometimes very small or 0 entire (*Crozophora*, *Ditaxis*,<sup>7</sup> *Philyra*,<sup>8</sup>), or crenate-dentate (*Speranskia*),<sup>9</sup> sub-3-lobed or 3-lobed (*Argythamnia*),<sup>10</sup> sometimes palmate-3-7-fid (*Chiroptetulum*),<sup>11</sup> rarely unequal, imbricated or more rarely contorted, sometimes subvalvate, not contiguous. Glands 5, alternipetalous, more or less distinct,

<sup>1</sup> Spec. about 40. L. Spec. 1007 (*Jatropha*).—POHL. Pl. Bras. i. 27, t. 10-48.—M. ARG. in *Linnaea*, xxxiv. 205.—H. BN. in *Adansonia*, i. 66, 145, 343; iii. 149; iv. 276.

<sup>2</sup> In *Adansonia*, i. 251.—M. ARG. Prodr. 728.—*Tandonia* H. BN. op. cit. i. 184, t. 7, fig. 1, 2 (nec Moq.)

<sup>3</sup> A genus on account of the æstivation of the calyx allied to *Jatropha*, and hence to *Tournesolia*, approximate as it appears to *Sarcocollinum* and *Pausandra*.

<sup>4</sup> Spec. 1. *T. cordifolia* H. BN. loc. cit.

<sup>5</sup> *Introd.* 243, n. 1097 (1777).—H. BN. in *Adansonia*, xi. 89.—*Crozophora* NECK. *Elem.* ii. 337, n. 1127 (1790).—A. JUSS. *Euphorbiac.* 27, t. 7.—NEES, *Gen.* ii. t. 37.—PAYER, *Organog.* 526, t. 110.—H. BN. *Euphorbiac.* 321, t. 15, fig. 12-22.—ENDL. *Gen.* n. 5829.—M. ARG. Prodr. 746 (incl.: *Androphorus* KARST. *Aphora* NUTT. *Argothamnia* SPRENG. *Argyrothamnia* M. ARG. *Argythamnia* SW. *Caperonia* A. S. H.

*Chiroptetulum* A. JUSS. *Chlorocaulon* KL. *Desfontanea* VELLOZ. *Ditaxis* VAHL. *Lepidococca* TURCZ. *Lepidocroton* PRESL. *Philyra* KL. *Phylera* ENDL. *Schinza* DENNST. *Scrophyton* BENTH. *Speranskia* H. BN. *Stenonia* DIEDR.).

<sup>6</sup> As to symmetry, much smaller however.

<sup>7</sup> A. JUSS. *Euphorb.* 27, t. 7, fig. 24.—ENDL. *Gen.* n. 5833.—H. BN. *Euphorb.* 298, t. 15, fig. 23-29.—*Anacanthium* (sect.) H. BN. in *Adansonia*, iv. 270.

<sup>8</sup> KL. in *Erichs. Arch.* (1841), 199.—H. BN. *Euphorb.* 297, t. 12, fig. 16-22.—*Phylera* ENDL. *Gen. Suppl.* ii. 91.

<sup>9</sup> H. BN. *Euphorb.* 388.

<sup>10</sup> P. BR. *Jam.* 339.—SW. *Prodr.* 39.—A. JUSS. *Euphorb.* 26, t. 7.—*Argyrothamnia* M. ARG. in *Linnaea*, xxxiv. 144; *Prodr.* 732.—*Euargyrothamnia* M. ARG. loc. cit. 148.

<sup>11</sup> A. JUSS. in *Ann. Sc. Nat.* sér. 1, xxv. 21.—ENDL. *Gen.* n. 5830.—H. BN. *Euphorb.* 336, t. 15.—*Chlorocaulon* KL. in *Endl. Gen. Suppl.* v. 89.

either quite free (*Aphora*),<sup>1</sup> or variously connate with petals and androecium, or closely clasping the androecium column at base (*Crozophora*). Stamens 10, 2-vericillate, or more rarely 3-5, oppositipetalous, sometimes 11-15, 3-vericillate, all inserted on central column in verticils higher than perianth; filaments beyond free; anthers erect introrse or extrorse (*Crozophora*), 2-rimose. Germen rudimentary placed between filaments at the summit of the column, sometimes more evolute (*Caperonia*), entire or 3-5-partite oftener minute or 0. Female calyx 4-5-merous imbricated or valvate, sometimes small or subsimilar to sepals (*Crozophora*), sometimes 0. Glands hypogynous, alterni-petalous free or coalescing, sometimes connate in urceolate disk (*Speranskia*) more rarely minute or 0. Germen 3-locular, sometimes surrounded by minute staminodes<sup>3</sup> (*Crozophora*); ovule solitary in cell; micropyle extorse superior,<sup>4</sup> capped by thin obturator; style branches 3, more or less, sometimes high, and once or several times 2- $\infty$ -fid or lacinate, stigmatiferous at apex. Capsule 3-coccous, seed subglobose exarillate; external coat soft, sometimes relaxed; testa outwardly smooth or tuberculate.—Annual or perennial herbs, undershrubs or shrubs; juice often purple. (*Crozophora*, *Argythamnia*, *Chiropetalum*); fragrance sometimes of *Melilotus* (*Philyra*); parts glabrous or pilose; hairs simple, ramified, stellate or lepidote; stem and branches unarmed or variously aculeate (*Caperonia*), sometimes spinosecent; leaves alternate, petiolate or subsessile, penninerved sub-3-plinerved at base, entire, dentate, sinuate, or lobate, base below 2-glandular, and at margin sometimes pauciglandular; stipules small, herbaceous or glanduliform, sometimes (*Philyra*) changed into spines. Flowers<sup>5</sup> 9 in axillary and terminal racemes, 1- or 2-sexual, solitary in the axil of each bract of the raceme or few cymose; female inferior; others rather more numerous male. (*Mediterranean regions, West India, North China, warm Eastern and Western Africa, tropical and subtropical America, North and South.*)

<sup>1</sup> NUTT. in *Trans. Am. Phil. Soc.* n. ser. v. 174.—*Scrophyton* BENTH. *Sulph.* 52.—ENDL. *Gen. Suppl.* v. 90.—*Stenonia* DIED. *Pl. Nunn. Univ. Hafn.* (1857), 24 (nec H. Bn.).

<sup>2</sup> A. S. H. *Pl. Rem. Brés.* 244; in *Mém. Mus.* xii. 343.—ENDL. *Gen.* n. 5831.—H. Bn. *Euphorb.* 299.—M. ARG. *Prodr.* 751.—*Schinza* DENNST. *Hort. Malab.* 7 (ex ENDL.).—*Cavanilla* VELLOS. *Fl. Flum.* v. t. 102.—*Lepidocroton* PRESL. *Epimel.* 213.—*Lepidococca* TURCZ. in *Bull. Soc. Mosc.* (1848), 588.—*Androphoranthus* KARST. *Fl. Columb.* ii. 15, t. 101.

<sup>3</sup> Sometimes subinferior at base on account

of subperigynous nature.

<sup>4</sup> Nucleus at apex much dilated complanate.

<sup>5</sup> Small, often imbued with a blackish colour.

<sup>6</sup> Spec. about 52. H. B. K. *Nov. Gen. et Spec.* vii. 169, t. 639 (*Ditaxis*).—KAR. et KIR. in *Bull. Soc. Imp. Nat. Mosc.* (1842), 446 (*Crozophora*).—KL. in *Hook. Journ.* ii. 50 (*Caperania*).—PRESL. *Epimel.* 213 (*Caperonia*).—GREN. et GODR. *Fl. de Fr.* iii. 100 (*Crozophora*).—SCHWEINF. *Fl. Nil.* 9 (*Crozophora*).—H. Bn. in *Adansonia*, i. 67, 245 (*Crozophora*); iv. 269 (*Ditaxis*), 288 (*Argythamnia*, *Chiropetalum*).

10. **Pausandra** RADLK.<sup>1</sup>—Flowers dioecious, 3-5-merous; calyx lobed, imbricated. Petals 3-5, contorted or imbricated. Stamens few (4-8), inserted round more or less conspicuous central concavity of receptacle, clothed with glandular sometimes inwardly undulate-cristate disk, the exterior 3-5 opposite petals. The interior 1-4, alternating with the preceding; filaments all free, finally subexserted; anthers 2-locular sub-4-locellate, introrsely rimose. Rudiment of gynæceum 0. Perianth of female flowers as in male...? Germen 3-locular; cells 1-ovulate. Capsule 3-coccous; seeds glabrous;<sup>2</sup> micropyle extrorse arillate.—Small trees glabrous or villulose; leaves alternate elongated-oblong subentire or dentate penninerved petiolate, 2-stipulate; flowers in simple axillary spikes simple or few times ramified glomeruliferous.<sup>3</sup> (*Trop. South America*.<sup>4</sup>)

11. **Monotaxis** AD. BR.<sup>5</sup>—Flowers monœcious or more rarely dioecious; male 4-5-merous; sepals valvate or scarcely imbricated (*Linidion*),<sup>6</sup> sometimes oftener scarcely contiguous, subvalvate, or more or less closely quincuncially-imbricated (*Reissipa*).<sup>7</sup> Petals same in number alternate; leaf more or less hastate-2-lobed and imbricated, or more rarely contorted. Stamens 8-10, 2-seriate; filaments free or connate at base, anthers 2-locular, extrorse or subintrorse; cells discrete from apex of connective transversely pendulous 2-armed, rimose. Glands 5, alternating with exterior stamens. Female calyx 4, 5-merous. Petals simple (*Reissipa*), or more rarely 0. Glands hypogynous 3, 5, sometimes 2-lobed. Germen 3-locular; ovules solitary; style nearly to base 3-partite; branches more or less high 2-fid; lobes stigmatiferous at apex, variously lacinate. Capsule 3-coccous; seeds arillate from exostome; embryo albuminous, thin, subcylindrical.—Small undershrubs; leaves alternate, opposite or ternate, subulate-stipulate, shortly petiolate, linear or lanceolate, entire recurved or revolute at margin, mucous or apiculate; flowers cymulose terminal (*Linidion*), or terminal but with lateral habit (*Reissipa*), and surrounded at base with younger lateral branches. (*Australia*.<sup>8</sup>)

<sup>1</sup> In *Flora* (1870), 81, t. 2.—H. BN. in *Adansonia*, xi. 91.

<sup>2</sup> Dusky-spotted.

<sup>3</sup> Proximate to *Tournefortia* sect. *Argythamnia*.

<sup>4</sup> Spec. 2, 3. CASAR. *Nov. Stirp. Bras. Dec.* 75.—WALP. *Rep.* v. 365 (*Thouinia*).

<sup>5</sup> In *Duperr. Voy. Coq. Bot.* t. 49 B; in *Ann. Se. Nat.* sér. i. xxix. 386.—ENDL. *Atakt.* 8, t. 8;

*Gen.* n. 5833.—H. BN. *Euphorbiac.* 307, t. 16, fig. 22-25.—M. ARG. *Prodr.* 212.

<sup>6</sup> H. BN. in *Adansonia*, vi. 291.

<sup>7</sup> STEUD. ex KL. in *Lehm. Pl. Preiss.* ii. 230.—*Hippocrepandra* M. ARG. in *Linnæa*, xxxiv. 61; *Prodr.* 207.—H. BN. in *Adansonia*, vi. 292.

<sup>8</sup> Spec. about 7. ENDL. *Enum. Pl. Hæg.* 19.—NEES in *Pl. Preiss.* ii. 230.—H. BN. in *Adansonia*, vi. loc. cit.

12. **Sarcoclinium** WIGHT<sup>1</sup>. — Flowers (nearly of *Jatropha*) dioecious; male sepals 5 or more rarely 3, 4, valvate. Petals same in number alternate, shorter than calyx, or sometimes twice as numerous as sepals, imbricated. Stamens central, 2-verticillate, twice as numerous as sepals, or more rarely 12–15; the more interior alternipetalous; filaments surrounded at base with 5 alternipetalous glands, subfree or oftener connate. Germen 3-locular; cells 1-ovulate;<sup>2</sup> style erect, afterwards 2-fid; branches 2–4-fid, stigmatiferous at apex. Capsule 3-cocceous; seeds albuminous exarillate.—Shrubs; branches thick; leaves<sup>3</sup> alternate petiolate 2-stipulate, penninerved, entire or serrate coriaceous; flowers axillary or supra-axillary spicate racemose, 2–6-stichous; bracts alternate imbricated, sometimes scarious, 1–3-flowered; pedicels cymose articulate. (*South Asia and trop. West Africa*.<sup>4</sup>)

13. **Galeria** ZOLL. AND MOR.<sup>5</sup>—Flowers dioecious; sepals 5, free or connate at base, valvate.<sup>6</sup> Petals 5, alternate, concave or subgaleate-cucullate, induplicate-valvate. Stamens 10, 2-seriate; exterior alternipetalous; filaments inserted below rudiment of gynæceum, connate at base; anthers introrse; the oppositipetalous nestled in the cavity of the petals; cells free, introrsely rimose, finally emarginate. Germen 2, 3-locular; ovules solitary; style afterwards divided into 2, 3 lobes 2-partite stigmatiferous at apex. Fruit coriaceous, irregularly compressed, non-valved, 1-spermous by abortion; seed albuminous; cotyledons of transverse embryo flat, wider than radicle.—Small trees;<sup>7</sup> leaves alternate, 2-stipulate entire penninerved veined; flowers in long pendulous terminal racemes. Male racemes fasciculate cymiferous; female simple.<sup>8</sup> (*Java, Malaisia*.<sup>9</sup>)

<sup>1</sup> Icon. t. 1887, 1888.—H. BN. *Euphorbiac.* 309, t. 11, fig. 17, 18; in *Adansonia*, xi. 93.—M. ARG. *Prodr.* 726.—*Agrostistachys* DALZ. in *Hook. Journ.* (1850), 41.—H. BN. *Euphorbiac.* 310.—M. ARG. *op. cit.* 725.

<sup>2</sup> Ovules usually descendent; micropyle extrorse superior or sometimes (in *S. Hookeri*) ascendent; micropyle introrse inferior.

<sup>3</sup> Usually large.

<sup>4</sup> Spec. 5. THW. *Enum. Pl. Zeyl.* 279.—M. ARG. in *Flora* (1864), 534; in *Linnæa*, xxxiv. 144 (*Agrostistachys*).

<sup>5</sup> *Syst. Verz.* (1846), 19 (nec HEIST. nec PRESL).—ENDL. *Gen. Suppl.* v. 94.—PL. in

*Ann. Sc. Nat.* sér. 4, ii. 259.—*Bennettia* R. BR. in *Hortf. Pl. Jar. Bar.* (1852), 249, 50 (nec MIQ.).—H. BN. *Euphorb.* 311.—SCHNIZL. *Iconog.* t. 172 \* \*.—M. ARG. *Prodr.* 1036.—*Cremnostachys* TUL. in *Ann. Sc. Nat.* sér. 3, xv. 259.

<sup>6</sup> Not contiguous in young bud, "ex directione pilorum marginum et ex forma imbricatis." (M. ARG.)

<sup>7</sup> Indumentum simple.

<sup>8</sup> A genus formerly connected with *Antidesma*.

<sup>9</sup> Spec. about 12. BL. *Bijdr.* 1124 (*Antidesma*).—MIQ. *Fl. Ind.-Bat.* Suppl. 471.—M. ARG. in *Linnæa*, xxxiv. 204 (*Bennettia*).

14. **Johannesia** VELLOS.<sup>1</sup>—Flowers monœcious; calyx gamophyllous, shortly 3-5-dentate at apex, valvate. Petals 3-5, imbricated or contorted. Glands alternipetalous 3-5. Stamens 8-10, 2-seriate, of which 5 are shorted exterior oppositipetalous; others longer 3-5, alternipetalous; filaments all connate at base in central column; anthers introrse, 2-rimose, finally versatile extrorse. Staminodes in female flower 3-5, shortly tongue-shaped, or sometimes 0. Germen 2- or more rarely 3-locular; ovules solitary in cells; micropyle extrorse superior obturated; style 2, 3-partite; branches twice 2-chotomous, 2-lobed, stigmatiferous at apex. Fruit capsular, fleshy; cocci 2, 3 with difficulty separating; cocci outwardly at apex porous; seeds albuminous.—A large rather milky tree; indumentum simple; leaves alternate digitate-compound, 3-7-foliolate; petiole at apex 2-glandular; secondary petiole naked; folioles penninerved; stipules linear-lanceolate; flowers in compound axillary corymbiform cymes; female in each cymule central; bracts often 2-glandular at base. (*Brazil*.<sup>2</sup>)

15. **Aleurites** FORST.<sup>3</sup>—Flowers monœcious; calyx valvate, unequally broken. Petals 5, contorted or imbricated. Male glands 5, sub-free or connate in urecolum, alternating with petals. Stamens  $\infty$ , inserted on conical receptacle, 2- $\infty$ -verticillate; filaments sub-free or synadelphous towards base; anthers introrse or more rarely extrorse,<sup>4</sup> 2-rimose. Perianth of female flowers as in male, but longer. Glands hypogynous 5, alternipetalous. Staminodes 0, or more rarely few.<sup>5</sup> Germen free, 2-5-locular;<sup>6</sup> style branches same in number, stigma-

<sup>1</sup> *Abgraf.* (1798), 199.—M. ARG. *Prodr.* 715.—*Joannesia* GOM. *Obs. Med. Bot.* 2, t. 1 (part. nec PERS.).—*Anda* A. JUSS. *Euphorb.* 39, t. 12, fig. 37.—MART. *Amœn. Monac.* t. 1.—ENDL. *Gen.* n. 5801.—H. BN. *Euphorb.* 316, t. 12, fig. 38-34.—*Andiscus* VELLOS. *Fl. Flum.* ii. t. 86.

<sup>2</sup> *Spec. i. J. princeps* VELLOS. *loc. cit.*—*Anda Gomesii* A. JUSS. *loc. cit.*—A. S. H. *Pl. Us. Bras.* t. 54, 55.—A. *Brasiliensis* RADD. *Mem. Quar. Plant. Bras.* 25.—*Andiscus pentaphyllus* VELLOS. *Fl. Flum.* ii. t. 86.—*Aleurites pentaphylla* WALL. *Cat. n.* 7959 (ex H. BN. *Euphorb.* 317; in *Adansonia*, iv. 284).

<sup>3</sup> *Char. Gen.* (1776), n. 56.—J. *Gen.* 389.—LAMK. *Dict.* i. 80; Suppl. i. 239.—A. JUSS. *Euphorb.* 38, t. 12, fig. 36.—ENDL. *Gen.* n. 5802.—H. BN. *Euphorb.* 345, t. 11, fig. 19, 20, t. 12, fig. 1-16.—M. ARG. *Prodr.* 722.—*Dryandra* THUNB. *Fl. Jap.* 267, t. 27 (nec R. BR.).—CORR.

in *Ann. Mus.* viii. 69, t. 32.—*Vernicia* LOUR. *Fl. Cochinch.* (ed. 1790), 586.—*Telopea* SOLAND. (ex GERTN. *Fruct.* ii. 195).—*Carda* NORONH. (ex HASSK. *Cat. Hort. Bog.* 236).—*Ambinix* COMMERS. (ex J. *Gen.* 389).—*Elæococca* COMMERS. (ex A. JUSS. *Euphorb.* 38, t. 11).—ENDL. *Gen.* n. 5804.—H. BN. *Euph. rb.* 318, t. 12, fig. 33-36.—*Elæococcus* SPRENG. *Syst.* iii. 884.—*Camirum* RUMPH. *Herb. Amboin.* ii. 180, t. 5.—GERTN. *Fruct.* ii. 194, t. 125.

<sup>4</sup> In *A. Trisperma* (BLANC. *Fl. d. Filip.* ed. 1. 755.—M. ARG. *Prodr.* 724, sect. 3 (*Rentiales*).—*A. Saponaria* BLANC. *op. cit.* ed. ii. 519).

<sup>5</sup> Sometimes but rarely fertile; hence a few flowers are hermaphrodite.

<sup>6</sup> Stellate indumentum entangled soluble from seed, and often (ex M. ARG.) taken for sacciform disk.

tiferous 2-fid at apex. Ovules solitary in cells; micropyle extrorse superior obturated. Fruit<sup>1</sup> fleshy-capsular; exocarp subdrupaceous solute; cocci 2-5, 1-spermous. Seeds<sup>2</sup> exarillate;<sup>3</sup> cotyledons of thickly albuminous embryo foliaceous orbiculate-ovate, digitinerved at base.—Trees; indumentum stellate or of simple or 2-fid hairs, constant; leaves alternate long petiolate, entire or thickly dentate or lobed, digitinerved at base, 2-glandular above; petioles often articulate at base; stipules usually 0, sometimes small inconspicuous or sooner or later caducous; flowers<sup>4</sup> in terminal racemes or axillary to the upper leaves, many times ramified cymiferous; the central in cymules often female more thickly stipitate.<sup>5</sup> (*Trop. Eastern Asia, Continental and ins. Trop. Oceania.*<sup>6</sup>)

16. **Sagotia** H. BN.<sup>7</sup>—Flowers monœcious, 5-merous; sepals same in number in both sexes and petals longer imbricated. Glands (in female flower 0) same in number alternating with petals. Stamens  $\infty$ , free, inserted on convex receptacle; filaments short erect; anthers introrse, 2-rimose. Germen 3-locular, cells 1-ovulate; style branches 3, 2-fid stigmatiferous at apex. Capsule furnished with long persistent perianth, 3-coecous; seeds axarillate.—A tree; leaves petiolate alternate, 2-stipulate, simple penninerved veined; flowers racemose. (*Guiana, North Brazil.*<sup>8</sup>)

17. **Chætocarpus** THW.<sup>9</sup>—Flowers diœcious apetalous; sepals 4, decussate imbricated. Glands of disk 4, opposite petals. Stamens 8-16; filaments connate at base with rudimentary germen, pilose; anthers introrse, 2-rimose. Germen 3-locular; branches of 3-partite style stigmatiferous, 2-partite at apex; ovules solitary in cells obturated. Fruit capsular; seed smooth arillate at micropyle.—Trees; wood hard; leaves alternate stipulate petiolate entire penninerved;

<sup>1</sup> Large; pericarp thick.

<sup>2</sup> Large globose, outwardly fleshy.

<sup>3</sup> Exterior coat, subequally incrassate fleshy; interior very hard.

<sup>4</sup> White or pink; the female larger.

<sup>5</sup> Sect. (ex M. ARG.) 3: 1. *Camirium*. Anthers always erect; germen 2-locular; indumentum stellar.—2. *Dryandra*. Anthers erect, then oscillating-extrorse reflexed and subpendulous; hairs at base 2-partite or subsimple.—3. *Rentiales*. Anthers few, 2-verticillate; germen 3, 4-locular; indumentum stellar.

<sup>6</sup> Spec. 3. L. Spec. 1000 *Jatropha*.—LOUR. *Fl. Cochinch.* 573 (*Juglans*).—KÆMPF. *Amœn. Exot.* 789 (*Abrasin*).—BLANCO, *Fl. de Filip.* 755; ed. 2, 719.—H. BN. in *Adansonia*, i. 146, 346; vi. 297.

<sup>7</sup> In *Adansonia*, i. 53 (nec WALP.).—M. ARG. *Prodr.* 1113.

<sup>8</sup> Spec. 1. *S. racemosa* H. BN. *op. cit.* i. 54; vi. 15.

<sup>9</sup> In *Hook. Journ.* (1854), 300, t. 10; *Enum. Pl. Zeyl.* 274.—H. BN. *Euphorbiac.* 223.—M. ARG. *Prodr.* 1121.

flowers in small cushions, axillary, densely glomerate, or the female sometimes pedicellate squamulose-bracteate. (*East India*,<sup>1</sup> *Brazil*.<sup>2</sup>)

18. **Heava** AUBL.<sup>3</sup>—Flowers monœcious apetalous; calyx 5-fid, valvate or subinduplicate, sometimes more rarely slightly twisted at apex. Stamens 5, 1-seriate<sup>4</sup> (*Euhevea*<sup>5</sup>), or 6–10, 2-seriate (*Bisiphonia*<sup>6</sup>) verticillate; the oppositipetalous 5 longer inferior;<sup>7</sup> others alternate inserted higher; anthers all extrorse, longitudinally 2-rimose, vertically inserted on erect central column. Disk 0 or rudimentary (*Euhevea*), oftener variously evolute round base of column (*Bisiphonia*). Germen rudimentary surmounting top of column. Germen of female flowers sessile; glands distinct or connate, sometimes subnil; cells 3, 1-ovulate; style column erect or very short, incrassate stigmatiferous lobes 2-lobed at apex. Fruit capsular;<sup>8</sup> cocci of soluble ligneous endocarp 2-valved; seeds<sup>9</sup> descendent; micropyle extrorse arillate.—Large trees; juice copious milky; leaves alternate long petiolate, digitate 3-foliate; folioles sessile or petiolulate penninerved, patellar-glandulose at base; flowers<sup>10</sup> in axillary and terminal ramified-cymiferous racemes; female thicker pedicellate central or 0 in each cymule. (*North Eastern Trop. S. America*.<sup>11</sup>)

19. **Trigonostemon** BL.<sup>12</sup>—Flowers monœcious; calyx 5-partite, sometimes shortly 5-dentate in male flower (*Dimorphocalyx*.<sup>13</sup>) Petals same in number alternate imbricated, sometimes minute or 0 (*Silvea*<sup>14</sup>). Stamens 5 (*Telogyne*<sup>15</sup>) or 3, 1-verticillate (*Silvea*, *Eutrigonostemon*<sup>16</sup>), sometimes 2-verticillate; verticels sometimes unequal in

<sup>1</sup> ROXB. *Fl. Ind.* iii. 848 (*Adelia*).—WALL. *Cat.* n. 7872 (*Bradleia*?).

<sup>2</sup> Spec. 1. *C. myrsinites* (sect. *Amanoella*, H. Bn. in *Adansonia*. xi. 94).

<sup>3</sup> *Guian.* 871, t. 335.—M. ARG. *Prodr.* 716.—*Siphonia* SCHREB. *Gen.* 656.—A. JUSS. *Euphorb.* 39, t. 12.—ENDL. *Gen.* n. 5799.—H. Bn. *Euphorb.* 324, t. 14, fig. 39–41, t. 15, fig. 1–11.—*Cautehoue* A. RICH. in *Journ. Phys.* (1785).—*Mierandra* R. Br. in *Horsf. Pl. Jav. Rar.* 237 (nec BENTH.).

<sup>4</sup> Alternating with calyx lobes.

<sup>5</sup> M. ARG. in *Linnaea*, xxxiv, 204.—Sect. *Hevea*. H. Bn. *Euphorb.* 326.

<sup>6</sup> H. Bn. *loc. cit.* 326 (sect. B).

<sup>7</sup> Alternating with lobes of disk and calyx.

<sup>8</sup> Exocarp often fleshy before maturity.

<sup>9</sup> Large dusky-spotty.

<sup>10</sup> Greenish or yellowish, small.

<sup>11</sup> Spec. about 8. L. F. *Suppl.* 422 (*Jatropha*).—PERS. *Syn.* ii. 588 (*Siphonia*).—W. *Spec.* iv.

567 (*Siphonia*).—H. B. K. *Nov. Gen. et Spec.* vii. 171 (*Siphonia*).—KL. in *Heym. Arzn.* xiv. t. 4, 5 (*Siphonia*).—BENTH. in *Hook. Journ.* (1854), 369.—H. Bn. in *Adansonia*, iv. 284.

<sup>12</sup> BL. *Bijdr.* 600.—ENDL. *Gen.* n. 5835.—H. Bn. *Euphorb.* 340, t. 11.—M. ARG. in *Linnaea*, xxxiv. 212; *Prodr.* 1105 (incl.: *Athroisma* GRIFF. *Dimorphocalyx* THW. *Enchidion* JACK (?), *Silvea* Hook. et Arn. *Telogyne* H. Bn. *Tritaxis* H. Bn.).

<sup>13</sup> THW. *Enum. Pl. Zeyl.* 278.

<sup>14</sup> Hook. et Arn. in *Beech. Voy. Bot.* 211.—H. Bn. *Euphorb.* 341.

<sup>15</sup> H. Bn. *Euphorb.* 327.

<sup>16</sup> M. ARG. in *Linnaea* xxxiv. 214.—*Trigonostemon* BL. *Fl. Jav. Prefat.* viii.—?—*Enchidion* JACK, in *Hook. Comp. to Bot. Mag.* ii. 257.—ENDL. *Gen.* n. 5838. (*Enchidion*).—H. Bn. *Euphorb.* 652.—M. ARG. *Prodr.* 1256.—*Athroisma* GRIFF. *Notul.* iv. 477.

number<sup>1</sup> (*Anisotaxis*<sup>2</sup>), or oftener 2, 3-verticillate; verticels equal or the third superior incomplete (*Dimorphocalyx*, *Tritaxis*,<sup>3</sup> *Cheilosopsis*<sup>4</sup>); central filaments more or less high, sometimes all connate; anthers introrse, 2-rimose (*Dimorphocalyx*, *Tritaxis*, *Anisotaxis*,) or extrorse (*Cheilosopsis*), sometimes patulous above and subhorizontally adnate to the margin of 3-agonal connective (*Eutrigonostemon*). Disk in flowers of both sexes evolute, sometimes minute or 0 (*Tritaxis*). Germen 3-locular; style branches varied in form 1 or 2-chotomous; cells 1-ovulate. Fruit capsular, sometimes furnished at base with accrescent calyx; cocci 3, 1-spermous; seeds exarillate. Trees or shrubs; leaves alternate 2-stipulate, usually shortly petiolate oblong penninerved, entire or serrate, often falsely verticillate, congested at summit of twigs; flowers axillary or terminal in subsimple or more or less ramified. (*Asia and Trop. N. Oceania*.<sup>5</sup>)

20. **Cluytia** MARTYN.<sup>6</sup>—Flowers dioecious; receptacle rather convex or oftener slightly concave; sepals 5 and petals same in number, alternate imbricated, finally slightly perigynous. Glands varied 10, 2-seriate, of which 5 alternipetalous are 2, 3-lobed. Germen sessile; cells 3, 1-ovulate; style more or less high, 3-lobed; the opposite simple or sometimes 2-lobed, usually smaller. Stamens 5, oppositipetalous; filaments hypogynous inserted on central column bearing at apex rudimentary germen entire or 2-3-lobed; anther introrse, 2-rimose. Glands in female flower 5, alternipetalous, usually 2-lobed, lobes 2-fid or 2-partite, stigmatiferous at apex. Capsule 3-coccous, furnished at base with persistent perianth; seeds albuminous descendent; micropyle arillate.—Shrubs or undershrubs, glabrous or pubescent (hairs simple); leaves alternate entire penninerved; stipules 0; flowers<sup>7</sup> solitary or cymose or glomerulate, axillary; female pedicels longer and thicker.<sup>8</sup> (*South Eastern Africa, South West Asia*.<sup>9</sup>)

<sup>1</sup> Inferior 5-merous; superior 3-merous.

<sup>2</sup> M. ARG. in *Linnaea*, xxxiv. 213; *Prodr.* 1107, sect. 4.

<sup>3</sup> H. BN. *Euphorb.* 342, t. 11, fig. 8-11.—M. ARG. *loc. cit.* sect. 3.

<sup>4</sup> M. ARG. *Prodr.* 1106, sect. 2.

<sup>5</sup> Spec. 15, 16. ROXB. *Fl. Ind.* iii. 733 (*Cluytia*).—WALL. *Cat.* n. 7717, 7740, 7849, 7997 (*Croton*), 7886 (*Cluytia*), 7852 (*Agyneia*).—NIMMO, *App. Cat. Bomb. Pl.* 251 (*Croton*).—? MICHX. *Fl. Ind.-at.* i. p. ii. 363 (*Enchidion*).—? RUMPH. *Herb. Amboin.* iii. 167, t. 160 (*Arbor Spicularum*).

<sup>6</sup> EX. *Bst. Reg.* t. 779.—AIT. *Hort. Kew.* iii.

411.—A. JUSS. *Euphorb.* 25, t. 6, fig. 21.—ENDL. *Gen.* n. 5840.—H. BN. *Euphorb.* 323, t. 16, fig. 1-21.—M. ARG. *Prodr.* 1043.—*Clutia* BOERH. *Lugd.-Bat.* ii. 260.—L. *Gen.* n. 1140.—J. *Gen.* 387.—GÆRTN. *Fruct.* ii. 117, t. 107.—LAMK. *Dict.* ii. 53; *Suppl.* ii. 302.—ALTOR. ADANS. *Fam. des Pl.* ii. 356.

<sup>7</sup> Usually whitish or greenish, sometimes rather purple.

<sup>8</sup> For genera, localities, and distinctive characters, see H. BN. *loc. cit.* 329.

<sup>9</sup> Spec. about 30. THUNB. *Fl. Cap.* (ed. SCH.), 150 (*Peneae*).—JACQ. *Hort. Schæubr.* ii. 67, t. 250.



21. **Pogonophora** Miers.<sup>1</sup>—Flowers diœcious; sepals 5, free or connate at base, much imbricated. Petals same in number longer, barbate within, imbricate. Stamens 5, alternipetalous, often 2-dentate, inserted between the lobes of the disk; filaments short free erect; anthers basifixed elongated introrsely, 2-rimose. Germen rudimentary central erect linear. Disk in female flower hypogynous submembranous. Germen 3-locular; cells 1-ovulate; style scarcely divided into 3 branches, stigmatiferous 2-lobed at apex; capsule 3-locate; seeds exarillate; hilum wide.—Trees or shrubs; leaves alternate petiolate penninerved; stipules small or 0; flowers in racemes or ramified glomerate spikes.<sup>2</sup> (*Trop. America*.<sup>3</sup>)

22. **Microdesmis** Pl.<sup>4</sup>—Flowers diœcious; sepals usually 5, sub-free or connate at base, imbricate. Petals same in number, alternate longer imbricated or twisted. Stamens 10 (*Gnaitocarpus*<sup>5</sup>), 5 of which are oppositipetalous shorter or 5 alternate (*Eumicrodesmis*); filaments inserted round the thickened diskiform base of rudimentary gynœceum, simple erect; anthers introrse, 2 rimose, connective sometimes shortly apiculate. Perianth of female flowers like male. Germen 2, 3-locular; ovule solitary in cell; style 2, 3, discrete at base, 2-partite erect much lacerate-papillose. Fruit drupaceous globose. Putamen thick, hard, outwardly much muricate; prickles penetrating the flesh of the mesocarp; seed albuminous; cotyledons of straight embryo ellipsoid or subcordate subequal to terete radicle.—Shrubs; leaves alternate (2-stichous) simple penninerved, subentire or dentate, pellucid-punctulate; stipules small subulate; flowers<sup>6</sup> axillary fasciculate-cymose. (*Trop. West Africa, India, China, Borneo*.<sup>7</sup>)

23. **Micrandra**.<sup>8</sup>—Flowers (nearly of *Pogonophora*) monœcious apetalous; sepals 5, 6, imbricated. Glandules in male flower same

—A. JUSS. in *Ann. Sc. Nat. sér. 3*, i. 27 (*Geissoloma*?).—W. *Spec. iv*, 879; *Hort. Berol.* t. 51, 52.—JAUB. et SPACH, *Ill. Pl. Or. t.* 465-468.—SONDER, in *Linnaea*, xxiii. 129.—BERN. in *Flora* (1845), 81.—M. ARG. in *Seem. Journ. of Bot.* i. 337.—H. BN. in *Adansonia*, i. 146, 345; iii. 150.

<sup>1</sup> In *Hook. Journ. of Bot.* (1854), 372.—H. BN. *Euphorb.* 332, t. 19, fig. 21-23.—M. ARG. in *Linnaea*, xxxiv. 202; *Prodr.* 1040.

<sup>2</sup> Gen. leaves, inflorescence, and perianth of *Icacina* referred to the same regions.

<sup>3</sup> *Spec. 2.* H. BN. in *Adansonia*, iv. 286.—M.

ARG. in *Flora* (1864), 434.

<sup>4</sup> In *Hook. Icon.* t. 758.—CLOS. in *Ann. Sc. Nat. sér. 4*, iv. 382.—H. BN. *Euphorb.* 668.—B. H. *Gen.* 124.—M. ARG. *Prodr.* 1041.

<sup>5</sup> PL. *loc. cit.* sect. 2.

<sup>6</sup> "Red," dry virescent, small.

<sup>7</sup> *Spec. 2.* *Hook. f. Niger*, 514, t. 26.—H. BN. in *Adansonia*, i. 65.

<sup>8</sup> BENTH. in *Hook. Journ.* (1854), 371 (nec R. BR.).—H. BN. *Euphorb.* 333.—M. ARG. *Prodr.* 709.—*Pogonophyllum* DIED. in *Nat. For. Vid. Medd.* (1857), 22.

in number, opposite sepals alternating with stamens round thick rudiment of gynæceum and shortly inserted. Stamens free; filaments refracted-incurved; anthers in bud when younger, extrorse; cells aduate to margin of rather wide connective, scarcely erect, introrse, and finally versatile. Sepals in female flowers 5, longer, deciduous. Germen 3-locular, surrounded at base by shortly urceolate disk, sometimes furnished with 1-5 staminodes. Style at apex thickly 3-lobed; lobes short 2-fid, ovules in cell solitary obturate. Capsule globose 3-coccate.—Trees; juice milky; leaves alternate, petiolate 2-stipulate entire, penninerved; flowers in axillary and terminal racemose cymiferous clusters, the female in central cymule short and thick pedicellate.<sup>1</sup> (*North Brazil*.<sup>2</sup>)

24. **Cunuria** H. BN.<sup>3</sup>—Flowers diœcious apetalous; sepals 5 in female flower rather thicker, imbricate. Stamens 10, 2-seriate round rudiment of gynæceum; filaments connate at base; the exterior shorter; anther introrse, 2-rimose. Female floral disk evolute, the margin divided into 6 acuminate teeth (staminodes?). Germen 3-locular; ovules solitary; micropyle extrorse superior thickly obturated; styles 3-partite branches thick widely 2-lobed recurved. Fruit capsular, 3-coccate; seeds exarillate.—A tree (or shrub?); leaves alternate petiolate; limb entire coriaceous penninerved, 2-glandular at base; male flowers cymose, the female congested in glomerules at the apex of the branches involucrate with bracts. (*North Brazil*.<sup>4</sup>)

25. **Mischodon** THW.<sup>5</sup>—Flowers diœcious; receptacle convex. Sepals 6, 2-seriate imbricate. Stamens 6, opposite sepals; filaments free, inserted outside below rudimentary capitate 3-agonal germen; anther extrorse or sublaterally 2-rimose. Germen free, 3-locular; cells 1-ovulate, styles 3-partite lobes dilated at apex sub-2-lobed. Capsule 3-coccate; seed smooth exarillate.—A ramified tree; younger branches sub-4-agonal puberulate; leaves opposite or 3-4-nate simple penninerved petiolate; male flowers in slender ramified terminal racemes and axillary to the upper leaf; the female in thicker terminal slightly ramified racemes. (*Zeylanica*.<sup>6</sup>)

<sup>1</sup> A genus not differing from *Elateriospermum*.

<sup>2</sup> Spec. 2, 3. H. BN. in *Adansonia*, iv. 286.

<sup>3</sup> In *Adansonia*, iv. 287.—M. ARG. *Prodr.* 1123.—*Clusiophyllum* M. ARG. in *Flora* (1864), 518.

<sup>4</sup> *C. Spruceana* H. BN. *loc. cit.*—*Micrandra Cunuri* H. BN. *loc. cit.*—*Pogonophora Cunuri* H.

BN. *loc. cit.*—*Clusiophyllum Spruceanum* M. ARG. *loc. cit.*

<sup>5</sup> In *Hook. Journ.* (1854), 299, t. 10 B; *Enum. Pl. Zeyl.* 275.—H. BN. *Euphorb.* 335.—M. ARG. *Prodr.* 1125.

<sup>6</sup> Spec. 1: *M. Zeylanicum* THW. *loc. cit.*

26. *Codiaeum* RUMPH.<sup>1</sup>—Flowers monœcious, 5- or more rarely 4-6-merous; sepals and petals sometimes small in female flower (*Blachia*<sup>2</sup>), minute or 0, imbricate. Glands same in number, alternipetalous or connate in annular lobed disk. Stamens  $\infty$ , inserted in the centre of conical receptacle; filaments free or more or less 1-adelphous; anthers introrse, lateral, or most usually extrorse; cells adnate to the connective in their whole length (*Phyllaurea*<sup>3</sup>), sometimes at the apex, or more or less high to the middle or more rarely to the base free (*Baloghia*,<sup>4</sup> *Steigeria*,<sup>5</sup>). Germen 3, 4-locular; style branches same in number simple (*Tylosepalum*,<sup>6</sup> *Synaspisma*,<sup>7</sup> *Ostodes*,<sup>8</sup> *Phyllaurea*) or 2-fid or partite (*Baloghia*), more rarely pluripartite (*Steigeria*); ovule solitary in cell; obturator usually rather thick. Fruit capsular; exocarp more or less fleshy or coriaceous thick, sometimes ligneous-capsular (*Ostodes*); cotyledons of albuminous embryo foliaceous; exostome richly or sparsely (*Ostodes*) arilate.—Trees or shrubs; leaves alternate or opposite entire penninerved; flowers in racemes 1, 2-sexual, terminal or axillary sometimes umbelliform. (*Warm Asia and Oceania*.<sup>2</sup>)

27. *Ricinocarpus* DESF.<sup>10</sup>—Flowers monœcious (of *Codiaeum*, sect. *Baloghia*); sepals imbricated or twisted, sometimes but rarely 0 (*Apetalidion*<sup>11</sup>). Glands alternate 5, free or adhering to interior of sepals (*Anomodiscus*<sup>12</sup>). Stamens  $\infty$ , 5-nate, inserted on central columella; anthers extrorsely rimose, more or less emarginate on both sides. Female calyx 5, 6-merous. Glands of hypogynous

<sup>1</sup> *Herb. Amboin.* iv. 65, t. 25-27.—A. Juss. *Euphorb.* 33, t. 9, fig. 30.—ENDL. *Gen.* n. 5818.—H. BN. *Euphorb.* 384, t. 16, fig. 26-35; in *Adansonia*, xi. 73-80.—M. ARG. *Prodr.* 1116.—? *Fahrenheitia* REICHB. F. et ZOLL. in *Linnaea*, xxviii. 599.—M. ARG. *Prodr.* 1256 (incl.: *Baloghia* ENDL. *Blachia* H. BN. *Desmostemon* THW. *Junghunia* MIQ. *Ostodes* BL. *Phyllaurea* LOUR. *Synaspisma* ENDL. *Steigeria* M. ARG. *Tylosepalum* KURZ).

<sup>2</sup> H. BN. *Euphorb.* 385, t. 19, fig. 18-20.

<sup>3</sup> LOUR. *Fl. Cochinch.* (ed. 1790), 575.—*Eu-codiaeum* M. ARG. *Prodr.* 1119 (sect. 4).—*Junghunia* MIQ. *Fl. Ind.-Bat.* i. p. ii, 412.

<sup>4</sup> ENDL. *Prodr. Fl. Norfolk.* 84; *Gen.* n. 5811; *Icon.* t. 122, 123.—H. BN. *Euphorb.* 344.

<sup>5</sup> M. ARG. in *Linnaea*, xxxiv. 215; *Prodr.* 1121.—H. BN. in *Adansonia*, xi. 74.

<sup>6</sup> KURZ. in *Teyssm. et Binn. Pl. Nov. vel Min. Cogn. Hort. Bog.* 36.

<sup>7</sup> ENDL. *Gen.* n. 5775.—H. BN. *Euphorb.* 387.—M. ARG. *Prodr.* 1120, sect. 5.

<sup>8</sup> BL. *Bijdr.* 619.—ENDL. *Gen.* n. 5803.—H. BN. *Euphorb.* 391; in *Adansonia*, xi. 78.—M. ARG. in *Linnaea*, xxxiv. 214; *Prodr.* 1114.—*Desmostemon* THW. *Enum. Pl. Zeyl.* 278.

<sup>9</sup> Spec. about 20. FORST. *Prodr.* 67 (*Croton*).—SPRENG. *Syst.* iii. 906 (*Treucia*).—LABILL. *Sert. Caled.* 77, t. 75 (*Crotophora*).—W. *Spec.* iv. 545 (*Croton*).—WIGHT. *Icon.* t. 1874 (*Croton*).—ROXB. *Fl. Ind.* iii. 680 (*Croton*).—MIQ. *Fl. Ind.-Bat.* i. p. ii. 384 (*Ostodes*).—H. BN. in *Adansonia*, i. 345 (*Baloghia*), 251, 348; ii. 214 (*Baloghia*), 218 (*Synaspisma*); vi. 296 (*Baloghia*), 303.

<sup>10</sup> In *Mém. Mus.* iii. 459, t. 22.—A. Juss. *Euphorb.* 36.—ENDL. *Gen.* n. 5812; *Iconogr.* t. 125 (*Ricinocarpus*).—H. BN. *Euphorb.* 343, t. 12, fig. 39-44.—M. ARG. *Prodr.* 204.—*Raperia* SPRENG. *Syst.* iii. 13 (nec A. Juss.).—*Echinosphæra* SIEB. MSS. (ex SOND. in *Linnaea*, xxviii. 562).

<sup>11</sup> M. ARG. in *Linnaea*, xxxiv. 59. (A legitimate species of this genus?)

<sup>12</sup> M. ARG. *loc. cit.* 59.

disk 5, 6, alternipetalous. Germen 3-locular; style scarcely divided into 3 branches, once or twice 2-fid or 2-partite. Fruit capsular, often tuberculate-rugose; seeds oblong subterete;<sup>1</sup> cotyledons of central elongated embryo longer, slightly wider or subequal to terete radicle, semiterete or subcomplanate.—Shrubs or undershrubs; leaves alternate exstipulate, usually narrow, entire revolute at margin; flowers in terminal or oppositifoliate cymes at summit of twigs, either 1-sexual or 2-sexual female flowers in the centre.<sup>2</sup> (*Australia*; *Tasmania*.<sup>3</sup>)

28. **Bertya** PL.<sup>4</sup>—Flowers (nearly of *Ricinocarpus*) monœcious apetalous eglandular; sepals 5, imbricated, sometimes subpetaloid. Stamens  $\infty$  (of *Beyeria*), inserted on central columella, imbricated; anthers extrorsely rimose; cells more or less or entirely discrete. Gynœceum fruit, seed, and embryo of *Ricinocarpus* (or *Beyeria*). Staminodes sometimes hypogynous  $\infty$ .—Shrubs or undershrubs virgateramified; indumentum often stellate; leaves alternate narrow coriaceous exstipulate; flower's axillary, surrounded by calyciform<sup>5</sup> involucre, and in this solitary or more rarely 2-nate or few. (*Australia*.<sup>5</sup>)

29. **Beyeria** MIQ.<sup>7</sup>—Flowers (nearly of *Ricinocarpus*) diœcious or more rarely monœcious; sepals 5, imbricated. Petals 5, imbricated, sometimes small or 0. Glands 5, alternipetalous in both sexes, more or less evolute (*Discobeyeria*<sup>8</sup>) or in female flowers 0 (*Eubeyeria*<sup>9</sup>). Stamens  $\infty$ ; filaments connate at base inserted on convex receptacle; anthers extrorse; cells long adnate to more or less 2-fid or entire connective (*Eubeyeria*, *Discobeyeria*), sometimes on account of 2-partite connective quite discrete erect-divergent (*Beyeriopsis*<sup>10</sup>). Germen 2, 3-locular; ovules solitary; micropyle obtected with rather thick obturator; style erect, presently dilated in stigmatiferous head, calyp-triform covering conical or sub-3-agonal germen. Fruit capsular,

<sup>1</sup> Often as in *Ricinus* dusky-spotted.

<sup>2</sup> A genus scarcely separated from *Baloghia* by narrower embryo and general aspect.

<sup>3</sup> Spec. about 12. ENDL. in *Hueg. Enum.* 18. —F. MUELL. *Fragm.* i. 56, 181.—H. BN. in *Adansonia*, vi. 294.

<sup>4</sup> In *Hook. Lond. Journ.* iv. (1845), 472, t. 16, fig. A.—ENDL. *Gen. Suppl.* v. 90.—H. BN. *Euphorb.* 347, t. 18, fig. 8, 9.—M. ARG. *Prodr.* 208.

<sup>5</sup> Leaves sometimes same in number as those of the calyx and alternate, representing true sepals and leaves, the real sepals might be taken for petals.

Spec. about 8, *Hook. f. Fl. Tasman.* i. 339.—M. ARG. in *Linnaea*, xxxiv. 63.—F. MUELL. et

SOND. in *Linnaea*, xxviii. 562 (*Ricinocarpus*).—F. MUELL. *Fragm.* iv. 34; 143.—H. BN. in *Adansonia*, vi. 297.

<sup>7</sup> In *Ann. Sc. Nat.* sér. 3, i. 350, t. 15.—ENDL. *Gen. Suppl.* v. 90. H. BN. *Euphorb.* 402, t. 18, fig. 13-17; in *Adansonia*, vi. 309.—M. ARG. *Prodr.* 201.—*Calyptrastigma* KL. in *Lehm. Pl. Preiss.* i. 175 (nec. TRAUTV. et C. A. MEX.). —*Clavipodium* DESVX. *Herb.* (ex H. BN. *loc. cit.*).

<sup>8</sup> M. ARG. in *Linnaea*, xxxiv. 59. sect. 1.

<sup>9</sup> M. ARG. in *Linnaea*, *loc. cit.* sect. 2.

<sup>10</sup> M. ARG. in *Linnaea*, xxxiv. 199; *Prodr.* 199.—H. BN. in *Adansonia*, *loc. cit.* 310 (worthless genera).

3-coccous; seeds descendent arillate at micropyle; albumen copious; cotyledons of straight embryo scarcely or not at all wider than long cylindrical radicle, semi-terete or slightly complanate.—Shrubs or undershrubs often viscous; leaves alternate narrow entire coriaceous exstipulate, articulate at base; flowers axillary solitary or scantily cymose. (*Australia*.<sup>1</sup>)

30. **Alphandia** H. BN.<sup>2</sup>—Flowers monœcious (nearly of *Codicum*); calyx gamophyllous, variously 5-dentate, valvate. Petals 5, imbricate. Glands of disk 5, alternipetalous membranous, free or connate in short ring. Stamens  $\infty$  (of *Codicum*); filaments shortly geniculate-recurved; anthers small extrorse; cells discrete above but aduate to the connective below. Female calyx gamophyllous, valvate, 5-dentate or unequally torn. Petals 5, larger rather thick imbricated, finally recurved. Hypogynous glands of disk 5, sometimes very small. Germen of *Codicum*; style afterwards 3-fid, branches 2-fid. Capsule elastically 3-coccous, cocci at back vertically 2-carinate-costate; seeds terete,<sup>3</sup> conoid-arillate at apex; cotyledons of copiously albuminous embryo elliptical foliaceous much wider than terete radicle.—Trees or shrubs scantily furfuraceous or luteo-resinous punctuate; leaves alternate petiolate exstipulate entire penninerved reticulate; flowers in terminal racemes or axillary to upper leaf; the lower flowers of the racemes female, others male; bracts of inflorescence 1-flowered or cymose-pluriflorous.<sup>4</sup> (*New Caledonia*.<sup>5</sup>)

31? **Cocconerion** H. BN.<sup>6</sup>—Flowers diœcious; male? . . . Female calyx 5-merous; sepals oblong, coriaceous, valvate. Petals and disk 0. Germen sessile, 2- or oftener 3-locular; ovules solitary; micropyle extrorse superior protected by obturator; style afterwards 2-3-branched; branches 2 or 3 stigmatiferous, 2-fid at apex. Capsule furnished at base with calyx, 2-3-coccous; seeds glabrous; micropyle arillate; cotyledons of copious oleose-albuminous embryo many times wider than radicle.—Trees or shrubs branches nodose; leaves verticillate (6-10-nate) shortly petiolate or subsessile, elongate-lanceo-

<sup>1</sup> Spec. ad 12. LABILL. *Pl. Nouv.-Holl.* ii. 72, t. 222 (*Croton*).—DC. *Syst. Veg.* i. 444; *Prodr.* i. 71 (*Hemistemma*).—SOND. in *Linnaea*, xxviii. 504.—HOOK. f. *Fl. Tasm.* i. 388.—BENTH. *Fl. Austral.* vi. 63.—F. MUELL. in *Trans. Phil. Soc. Vict.* i. 16.—H. BN. in *Adansonia*, vi. 304.

<sup>2</sup> In *Adansonia*, xi. 85.

<sup>3</sup> Nigrescent-spotted.

<sup>4</sup> A genus, having much affinity with *Codicum*, sect. *Steigeria*, differs particularly in aspect and by gamophyllous valvate calyx not imbricate.

<sup>5</sup> Spec. 2. H. BN. *loc. cit.* 86.

<sup>6</sup> In *Adansonia*, xi. 87.

late integerrimous, coriaceous, penninerved; flowers female, axillary solitary verticillate pedunculate.<sup>2</sup> (*New Caledonia*.<sup>7</sup>)

32. **Fontainea** HECK.<sup>3</sup>—Flowers diœcious or more rarely monœcious (nearly of *Codicum* or *Alphandia*); calyx gamophyllous sacciform very shortly 4–5-dentate at apex, valvate, sometimes unequally broken. Petals <sup>4</sup> 3, 6, imbricate. Stamens  $\infty$ , central (of *Codicum*), exterior of base surrounded by continuous 4–6-agonal disk; anthers extrorsely rimose; cells adnate to linear connective or more or less high discrete at apex. Calyx of female flowers valvate, unequally broken. Petals as in male flower. Disk hypogynous continuous surrounding base of gynœceum; germen 3–6-locular; cells (when equal in number) oppositipetalous; style afterwards divided into branches, same in number, rather thick, stigmatiferous within; ovules solitary; micropyle obtected by short obturator. Fruit drupaceous, suboliviform or obtuse angular; putamen osseous; cells 2–6; 1 (or rarely 2, 3), usually fertile, others small effete. Seeds exarillate glabrous; albumen copious oily; cotyledons of central embryo foliaceous elliptical many times wider than terete radicle.—A shrub or tree, small leaves alternate or subopposite, petiolate, exstipulate, glaberrimous; entire penninerved reticulate-veined; flowers axillary and terminal falsely racemose, more or less cymose bracteate. (*New Caledonia*.<sup>5</sup>)

33. **Givotia** GRIFF.<sup>6</sup>—Flowers (nearly of *Codicum*) diœcious; sepals 5 and petals same in number alternate, imbricated. Stamens  $\infty$  (sometimes 15–20), inserted round convex glandular-thickened receptacle; filaments erect; anthers adnate, introrsely and extrorsely rimose. Perianth and disk of female flowers as in the male. Germen 2, 3-locular; cells 1-ovulate; style afterwards 2–3-fid; branches 2-fid. Fruit fleshy indehiscent destitute of columella, by abortion 1-spermous; seed exarillate copiously albuminous; cotyledons of wide embryo foliaceous, digitinerved at base—A tree;<sup>7</sup> densely covered with stellate indumentum; leaves alternate petiolate digiti-

<sup>1</sup> A genus whose place is uncertain, the male flowers being unknown, but probably near *Codicum*, differs by its apetalous eglandular flowers and verticillate leaves.

<sup>2</sup> Spec. 2. H. Bn. loc. cit. 88.

<sup>3</sup> And upon *Fontainea* (thès. Fac. Méd. de Montpellier. 1870).—H. Bn. in *Adansonia*, xi. 80.

<sup>4</sup> Thick subcoriaceous, silky on both sides, white, very fragrant.

<sup>5</sup> Spec. 1. *F. Pancheri* HECK. loc. cit.—*Baloghia*? *Pancheri* H. Bn. in *Adansonia*, ii. 214.—*Codicum*? *Pancheri* M. Aro. Prodr. 1117.

<sup>6</sup> *Pl. Hort. Calcutt.* 14.—ENDL. Gen. n. 5802 (Suppl. v. 89).—H. Bn. *Euphorb.* 389.—M. Aro. Prodr. 1112.—*Gorania* WALL. Cat. n. 7851.

<sup>7</sup> Aspect of *Echinus Sumbavia*, scarcely differing by non-capsular fruit.

nerved; flowers in compound terminal cymiferous racemes. (*India or Zeylan*<sup>1</sup>).

34. **Baliospermum** BL.<sup>2</sup>—Flower (nearly of *Codiaeum*) monœcious apetalous; receptacle shortly convex. Sepals 5 (or more rarely 4, 6), imbricated. Glands same in number or unequally connate, exterior to androecium. Stamens  $\infty$ , central; filaments free or connate at base, at apex dilated in basifixed connective; anther cells lateral or first extrorse, 2-rimose, adnate to connective at margin. Disk in female flower shortly urceolate, unequally or subequally crenate. Germen 3–4-locular; cells 1-ovulate; style afterwards divided in 3, 4 branches, rather thick patulous recurved, 2-lobed above. Fruit capsular, 3–4-coccous; seeds smooth; exostome thickly arillate.—Shrubs or herbs lignescent at base subglabrous or glabrous; leaves alternate petiolate glandular 2-stipulate repando-dentate or subentire penninerved; flowers in axillary racemes, more or less ramified cymiferous; sexes mixed or female below; fruit-bearing pedicels recurved.<sup>3</sup> (*Australia and Trop. and Sub-Trop. Oceania*.<sup>4</sup>)

35. **Sumbavia** H. BN.<sup>5</sup>—Flowers (nearly of *Givotia* or *Baliospermum*), monœcious, 5-merous; male calyx valvate. Petale 5, often small, imbricate. Stamens  $\infty$ , inserted round convex receptacle, thickened into rudimentary disk outside; filaments free erect; anthers subbasifixed erect; cells adnate introrsely rimose. Female calyx 6-partite; folioles valvate or slightly imbricated; petals 6, much shorter than in the male flower. Germen 3-locular; style erect, afterwards 3-fid; branches circinate-revolute, inwardly at apex stigmatiferous. “Capsule 3-coccous; seeds arillate.”—Trees<sup>6</sup> unarmed or subspinose; indumentum subfloccose stellate; leaves alternate petiolate penninerved, 3-plinerved at base, entire or repando-dentate; flowers in terminal racemes; female few (1–3) inferior or 0; bracts 1-floral. (*East India, Ind. Arch., Java*.<sup>7</sup>)

<sup>1</sup> Spec. 1. *G. rotleriformis* GRIFF. loc. cit.—WIGHT, *Icon.* t. 1889.—THW. *Enum. Pl. Zeyl.* 278.—*Govania nivea* WALL. loc. cit.

<sup>2</sup> *Bijdr.* 603.—ENDL. *Gen.* n. 5823.—H. BN. *Euphorb.* 394.—M. ARG. *Prodr.* 1125.

<sup>3</sup> A genus differing much from *Suregada* by inflorescence and aril.

<sup>4</sup> Spec. 4, 5. *W. Spec.* iv. 563 (*Jatropha*).—GEISEL. *Crot. Monogr.* 74 (*Croton*).—SPRENG. *Syst.* ii. 546 (*Hedycarya*).—DECNE. in *Jacquem.*

*Voy.* t. 155.—WIGHT, *Icon.* t. 1885.—WALL. *Cat.* n. 7727 (*Ricinus*).—ROXB. *Fl. Ind.* iii. 682. (*Croton*).—WALL. *Cat.* n. 7727 A. (*Ricinus*), 7827 (*Croton*).

<sup>5</sup> *Euphorb.* 390.—M. ARG. *Prodr.* 727.—*Dorzylyon* ZOLL. in *Linnæa*, xxix. 469 (1859).

<sup>6</sup> Habit, etc., of *Echinos*, from which it scarcely differs by petals being present.

<sup>7</sup> Spec. 2. M. ARG. in *Flora* (1864), 482.

36. **Echinus** LOUR.<sup>1</sup>—Flowers monœcious or more rarely diœcious (nearly of *Sumbavia*) apetalous; male calyx 2–5-partite, valvate. Stamens  $\infty$ , inserted on central elevated subdilated eglandular receptacle; filaments free or connate at base; anthers introrse or more rarely extrorse; cells rimose adnate or free below (*Podadenia*<sup>2</sup>), sometimes inserted below dilated connective, discrete. Female calyx 3–6-partite, valvate or more rarely more or less imbricated. Germs free, 3-locular or rarely 2–5-locular, surrounded by hypogynous disk of varied form (*Melanolepis*,<sup>3</sup> *Blumcodendron*,<sup>4</sup>), or oftener 0; cells 1-ovulate; style branches simple, sometimes more or less dilated, largely and thickly papillose within. Staminodes hypogynous  $\infty$ ,<sup>5</sup> or much oftener 0. Fruit capsular, 2–5-coecous, more rarely with difficulty or scarcely dehiscing (*Coccoceras*<sup>6</sup>) and subfleshy (*Podadenia*), unarmed or sometimes echinate (*Rottleropsis*,<sup>7</sup> *Melanolepis*) or aculeate (*Axenfeldia*<sup>8</sup>), more rarely dorsally carinate or more or less sometimes long horned (*Cordemoya*,<sup>9</sup> *Coccoceras*); seeds exarillate or more rarely at micropyle slightly carunculate (*Coccoceras*).—Trees and shrubs; leaves alternate or more rarely opposite, 2-stipulate, penninerved or digitinerved, sometimes peltate, entire dentate or lobed, oftener below sprinkled with dusky or yellow glands; indumentum simple, stellate or 2-morphous. Flowers terminal, axillary or lateral, racemose or spicate; spikes or racemes subsimple or oftener ramified, bearing glomerules or cymes; calyx generally ecalyculate or sometimes (*Diplochlamys*<sup>10</sup>) in female flower bracts 5, in involucrem representing external calyx.<sup>11</sup> (*Asia, Warm Asia, Oceania and Africa*.<sup>12</sup>)

<sup>1</sup> *Fl. Cochinch.* (ed. 1790), 633.—ENDL. *Gen.* n. 5887.—H. BN. in *Adansonia*, xi. 130, not.—

*Mallotus* LOUR. *op. cit.* 635.—M. ARG. in *Linnaea*, xxxiv. 184; *Prodr.* 956.—*Rottlera* ROXB. *Pl. Coromand.* i. 36, t. 168.—A. JUSS. *Euphorb.* 32, t. 9.—H. BN. *Euphorb.* 421.—*Adisca* BL. *Bijdr.* 609.—*Plagianthera* REICHB. F. *ZOLL. Ov. Soort v. Rottlera*. 19.—*Echinocroton* F. MUELL. *Fragm.* i. 31 (incl.: *Axenfeldia* H. BN. *Boutonia* BOJ. *Coccoceras* MIQ. *Cordemoya* H. BN. *Diplochlamys* M. ARG. *Hancea* SEEM. *Melanolepis* REICH. F. et ZOLL. *Podadenia* THW.

<sup>2</sup> THW. *Enum. Pl. Zeyl.* 273.—M. ARG. *Prodr.* 791.

<sup>3</sup> REICHB. F. et ZOLL. in *Linnaea*, xxviii. 324.—H. BN. *Euphorb.* 398.—M. ARG. *Prodr.* 957.

<sup>4</sup> M. ARG. *Prodr.* 956 (sect. 1).—*Elatiospermum* (part.) BL. *Bijdr.* 621.

<sup>5</sup> Sometimes antheriferous (H. BN. *Euphorb.* t. 19, fig. 31; in *Adansonia*, vi. 370).

<sup>6</sup> MIQ. *Fl. Ind.-Bat. Suppl.* 465.—M. ARG.

*Prodr.* 949.—H. BN. in *Adansonia*, xi. 89.

<sup>7</sup> M. ARG. *Prodr.* 957 (sect. 2).

<sup>8</sup> H. BN. *Euphorb.* 419.—*Hancea* SEEM. *Voy. Herald, Bot.* 409, t. 96.

<sup>9</sup> H. BN. in *Adansonia*, i. 255.—M. ARG. *Prodr.* 960 (sect. 4).—*Boutonia* BOJ. *Hort. Maur.* 282 (nec. DC.).—BOUT. *Trav. Soc. Hist. Nat. Maur.* (1846), 51.

<sup>10</sup> M. ARG. in *Flora* (1864), 539; *Prodr.* 1023.

<sup>11</sup> Sect. igit. 9: 1. *Euechinus* (*Rottlera* ROXB.).—2. *Rottleropsis* (M. ARG.).—3. *Blumcodendron* (M. ARG.).—4. *Axenfeldia* (H. BN.).—5. *Cordemoya* (H. BN.).—6. *Melanolepis* (REICHB. F. et ZOLL.).—7. *Podadenia* (THW.).—8. *Coccoceras* (MIQ.).—9. *Diplochlamys* (M. ARG.).

<sup>12</sup> Spec. ad 75. L. *Spec.* 1005 (*Croton*).—THUNB. *Fl. Jap.* 270, t. 28, 29 (*Croton*).—LOUR. *Fl. Cochinch.* (ed. 1790), 585 (*Ricinus*).—VAHL, *Symb.* ii. 97 (*Croton*).—GEIS. *Crot. Monogr.* 73 (*Croton*), 81 (*Aleurites*).—W. *Spec.* iv. 567 (*Ricinus*).—SPRENG. *Syst.* iii. 878 (*Rottlera*).—



37 ? **Cheilosa** BL.<sup>1</sup>—Flowers (nearly of *Echinus*) dioecious; calyx subvalvate or slightly imbricate. Stamens inserted round rudimentary gynæceum free; anthers introrse; cells adnate rimose. Disk 10-glandular; glands 2-plicate alternating in series. Germen 3-locular; cells 1-ovulate; style branches 3, shortly 2-fid, stigmatiferous at apex. Fruit capsular; exocarp thick; seeds exarillate. Other characters of *Echinus*.<sup>2</sup>—A tree; leaves alternifoliate penninerved; flowers in axillary cymiferous racemes. (*Java*.<sup>3</sup>)

38. **Epiprinus** GRIFF.<sup>4</sup>—Flowers monœcious. Male calyx naked, 4-partite, valvate. Stamens  $\infty$ , usually few; filaments free inserted round base of rudimentary gynæceum, in bud 2-plicate; anthers introrse, 2-rimose. Female calyx 6-partite; leaves reduplicate, after florescence much foliaceous accrescent, surrounded outside by bracts same in number, shorter alternate (of involucre). Germen 3-locular; cells 1-ovulate; style straight afterwards transversely 3-lobed beyond articulation; leaves thick 2-fid; divisions inisopapillose. Fruit capsular 3-dymous, surrounded at base with accrescent perianth and involucre. Seed ?—A tree; leaves alternate petiolate entire penninerved large; flowers racemose, axillary to upper leaves; female pedicels finally long, calyculate;<sup>5</sup> lobes of epicalyx alternating with those of calyx, smaller, distinctly 2-glandular.<sup>6</sup> (*Malaisia*.<sup>7</sup>)

39. **Garcia** ROHR.<sup>8</sup>—Flowers monœcious; receptacle convex. Calyx gamophyllus, valvate, unequally or subequally broken (2-4-partite). Male petals to 10, female to 8, 2-seriate, verticillate, strong, outwardly and at margin sub-imbricate, much sericeo-villose. Disk in both sexes shortly urceolate, deeply pectinate-dentate. Stamens  $\infty$ , free; the receptacle dilated between them in ciliate unequal

SCHUM. et THÖNN. *Beska*. 410 (*Acalypha*).—ROXB. *Fl. Ind.* iii. 828 (*Rottlera*).—SIEB. et ZUCC. *Fl. Jap.* t. 79 (*Rottlera*).—BENTH. *Niger*, 506 (*Claoxylon*); *Fl. Austral.* vi. 138 (*Mallotus*).—ZOLL. et MOR. *Vern.* 17 (*Mappa*).—THW. *Enum. Pl. Zeyl.* 272 (*Rottlera*), 273 (*Podadenia*).—H. BN. in *Adansonia*, i. 69, 259; ii. 223 (*Rottlera*); iv. 313.

<sup>1</sup> *Bijdr.* 613.—ENDL. *Gen.* n. 5821.—H. BN. *Euphorb.* 420.—M. ARG. *Prodr.* 1123.

<sup>2</sup> To which genus it is undoubtedly allied.

<sup>3</sup> Spec. 1. *C. Montana* BL. *loc. cit.*—HASSK.

*Hort. Bog.* 232.—Miq. *Fl. Ind.-Bat.* i. p. ii. 410.

<sup>4</sup> *Posth. Pap.* 487.—M. ARG. in *Linnaea*, xxxiv. 144; *Prodr.* 1024.

<sup>5</sup> After the manner of *Hibiscus*.

<sup>6</sup> Much better made a sect. of *Echinus*?

<sup>7</sup> Spec. 1. *E. Malayanus* GRIFF. *loc. cit.*

<sup>8</sup> In *Act. Soc. Hist. Nat. Hafn.* ii. 217, t. 9.—VAHL, *Symb. Bot.* iii. 99.—A. JUSS. *Euphorb.* 41, t. 13, fig. 40.—ENDL. *Gen.* n. 5797.—H. BN. *Euphorb.* 392, t. 14, fig. 23-38.—M. ARG. *Prodr.* 721.

scales. Anthers 2-locular, rimose; exterior or all extrorse. Germen 3-locular; cells 1-ovulate; style erect, distinct, thickly 3-lobed, stigmatiferous at apex; lobes obovate-ovate, reflexed, 2-fid, stigmatiferous at apex. Capsule 3-coccous; cocci 2-valved; seeds albuminous smooth exarillate.—A tree; indumentum simple; leaves alternate exstipulate petiolate entire penninerved; flowers<sup>1</sup> axillary to upper leaves or terminal, subsolitary or in few flowered (spurious?) racemes.<sup>2</sup> (*Warm America, N. and S.*<sup>3</sup>)

40. **Crotonogyne** J. MUELL.<sup>4</sup>—Flowers diœcious. Male calyx gamophyllous, scarcely unequally broken, valvate. Petals 5–7, concave, inwardly at base hirsute with glands; præfloration contorted. Glands 5–7, glabrous thick, unequally fusiform, alternating with petals. Stamens 3 times more numerous than petals, verticillate, 3-serrate, 5–7 exterior evidently shorter opposite petals, same number alternating with these larger; and the same number quite interior also opposite petals; filaments connate at base only, afterwards free; anthers 2-locular, introrse, 2-rimose. Female calyx thick, 5-partite; lobes unequal furnished at margin with 2–6 verrucose glands depressed scutillate; æstivation imbricate. Petals (male) 5–6 slightly thicker, caducous; præfloration contorted. Disk hypogynous annular membranous subentire. Germen 3-locular. Style erect afterwards 3-partite; lobes 4-partite, teeth subulate reflexed. Ovules in each cell solitary obturated; micropyle extrorse superior. Capsules 3-coccous; seed approaching arillate.—A shrub, scantily lepidote-squamose; leaves alternate petiolate penninerved reticulate-veined above base patellate-glandular; stipules 2; male flowers in axillary interrupted spicate glomerules; female long pedicellate in few-flowered (4–6) axillary racemes.<sup>5</sup> (*Trop. West Africa.*<sup>6</sup>)

41. **Manniophyton** J. MUELL.<sup>7</sup>—Flowers diœcious; receptacle rather convex. Male calyx valvate, unequally 2–3-broken. Corolla high gamopetalous urceolate, shortly 5-lobed. Glands 5, alternipetalous thick. Stamens  $\infty$  (12–20), filaments free unequal; an-

<sup>1</sup> Purpurescent whitish villose.

<sup>2</sup> A genus with male flowers; recalls some *Bixaceæ*.

<sup>3</sup> Spec. 1. *G. nutans* ROHR. *loc. cit.*

<sup>4</sup> In *Flora* (1864), 535; *Prodr.* 720.

<sup>5</sup> "Charact. fere omnes ut in *Crotone*, nec

habit. a specieb. *Crotonis* coh. *Eutropiæ* longe reced., sed calyx masc. irreg. rumpendus et stam. in alabastr. recta." (M. ARO.)

<sup>6</sup> Spec. 1. *C. Manniana* M. ARO. *loc. cit.*

<sup>7</sup> In *Flora* (1864), 530; *Prodr.* 719.

thers introrse, 2-rimose. Germen rudimentary, usually 0, sometimes minute. Female sepals 5, slightly connate at base. Petals 5, much longer, free, much imbricated. Disk hypogynous minute. Germen 3-locular, densely hirsute; ovule solitary in cell, rather thickly obturated; styles 3, thick stigmatiferous, 2-partite at apex. Fruit 3-coccate; cocci compressed at the sides, solute from central columella dehiscant; seeds exarillate.—Scandent shrubs; indumentum stellate;<sup>1</sup> leaves alternate petiolate, 2-stipulate, entire or 3-lobed, 5-plinerved at base; flowers in axillary cymiferous racemes.<sup>2</sup>—(*Trop. West. Africa.*<sup>3</sup>)

42 ? **Paracroton** Miq.<sup>4</sup>—“Flowers monœcious (?); sepals 5, imbricated. Petals same in number, imbricated. Stamens 15–20; filaments central, 1-adelphous; anthers extrorse, 2-rimose. Glands of disk alternipetalous. Germen 3-locular, 3-agonal-pyramidal; style branches 3, 2-fid rather acute; cells 1-ovulate.” Capsule thick lignous; cocci 2-valved. Seeds transversely ellipsoid wider than long, glabrous; albumen copious; embryo wide; cotyledon large reniform, digitinerved at base.—A medium sized tree; branches patent; leaves alternate petiolate lanceolate repando-serrate, 2-glandular at base; flowers in immense terminal racemes;<sup>5</sup> peduncle compressed; pedicels alternate fasciculate.<sup>6</sup> (*Java.*<sup>7</sup>)

43. **Leucocroton** GRISEB.<sup>8</sup>—Flowers diœcious apetalous. Male calyx 3–4-partite, valvate. Glands of disk same in number, usually short, oppositisepalous. Stamens 6–10, inserted below minute rudiment of gynœceum; filaments free except at base; anthers introrse, 2-rimose. Female calyx 5, 6-partite, valvate; glands of disk same in number opposite. Germen 3-locular; cells 1-ovulate; style afterwards 3-partite, branches flabellate-3–5-fid; lobes scarcely flabellate,  $\infty$ -fid papillose. Fruit 3-cocceous; seeds exarillate smooth.—Pale, or yellowish shrubs; indumentum short depressed stellate; leaves alternate petiolate penninerved or 5-plinerved subcoriaceous; stipules 0, or very minute; male flowers in racemes or subsimple or

<sup>1</sup> Reddish brown or reddish.

112.

<sup>2</sup> A genus allied to *Crotyne* similar in flowers and male calyx to *Jatropha Heudelotii*, (i. e. *Ricinodendron* M. ARG.) differs in not having compound leaves.

<sup>3</sup> “3, 4-pedales.”

<sup>4</sup> Spec. 2. M. ARG. in *Seem. Journ. of Bot.* (1864), 332.

<sup>5</sup> A genus very imperfectly known, allied to *Codiaeum*.

<sup>6</sup> Spec. 1. *P. pendulus* Miq. loc. cit.—*Croton pendulus* HASSK. *Pl. Jav. Kar.* 266.

<sup>7</sup> *Pl. Amer. Trop.* 21; *Pl. Wright*, 160.

<sup>8</sup> *Fl. Ind.-Bat.* i. p. ii. 382.—M. ARG. *Prodr.*

racemose spikes; female spicate; spike branches 1-florous at apex composed of lateral and flowerless bracts; male bracts 1-5-florous; pedicels articulate.<sup>1</sup> (*Cuba*.<sup>2</sup>)

44? **Pseudocroton** M. ARG.<sup>3</sup>—"Flowers diœcious; male calyx 4-partite, valvate. Petals 4, imbricate. Glands of extrastaminal disk 4, free alternipetalous. Stamens 16-20; filaments free short inserted round distinctly entire rudimentary gynœceum; anthers always erect, 2-rimose; cells adnate longitudinally to connective. Female flower. . . ?—A shrub (or tree?); leaves alternate petiolate minutely 2-stipulate penninerved veined, below, or the entire plant protected by ferruginous angular scales; male flowers subterminal abbreviate racemulose.<sup>4</sup> (*Guatemala*.<sup>5</sup>)"

45. **Suregarda** ROXB.<sup>6</sup>—Flowers monœcious or oftener diœcious apetalous; receptacle rather convex. Sepals 4, 5, imbricate, unequal; the exterior sometimes (*Ceratophorus*) dorsally cucullate. Stamens  $\infty$ , free; filaments erect; the receptacle between their bases outwardly sometimes slightly glandular thickened; anthers adnate, extrorsely 2-rimose. Germen surrounded by base of disk shortly urceolate, and often with  $\infty$  staminodes, unequal acute, 2-3-locular; style short, afterwards divided into thick short stigmatiferous lobes, 2-4-fid; ovule in cell solitary. Fruit capsular, subdrupaceous or fleshy, with difficulty or easily dehiscing; seed albuminous exarillate, generally smooth.—Small trees or shrubs generally glabrous; leaves alternate or opposite simple coriaceous penninerved veined; stipules 2; cicatrice sometimes linear; petiole short; flowers axillary or oftener oppositifolious, terminal or fasciculate cymose. (*Trop. Asia and Oceania, South and East Africa Ins. and Cont.*<sup>7</sup>)

46. **Elaterospermum** BL.<sup>8</sup>—Flowers monœcious apetalous;

<sup>1</sup> Resembling the genus *Ricinella* and nearly allied to the American sect. *Tournefortia*.

<sup>2</sup> Spec. 3. GRISEB. *loc. cit.*; in *Nachr. d. Koenigl. Gesellsch. d. Wiss. d. Univ. Gatt.* (1865), 175.—M. ARG. *Prodr.* 756.

<sup>3</sup> In *Flora* (1872), 24.

<sup>4</sup> "Gen. juxta *Leucocrotonem* inserend. a quo præter petala evoluta et flor. 4-meros char. gravior. seq. differt: recept. haud elevat. rudim. ovarii evolutum in fundo calycis intra stam. lib. nec in columna stam. insert. Habit. et præsl. lepid. ferr. *Crotonem* simulat, sed antheræ in alabastr. erectæ et circa rudim. sitæ."

<sup>5</sup> Spec. 1. *P. tinctorius* M. ARG. *loc. cit.*

<sup>6</sup> Ex W. in *Act. Soc. Cur. Nat. Berol.* iv. 206

(1803).—A. JUSS. *Euphorb.* 60.—ENDL. *Gen.* n. 5883.—H. BN. *Euphorb.* 395; in *Adansonia*, xi. 92.—*Gelonium* ROXB. in *W. Spec. Pl.* iv. 831 (1805); *Fl. Ind.* iii. (1832), 829, nec GÆRTN.).—A. JUSS. *loc. cit.* 34, t. 10.—ENDL. *Gen.* n. 5817.—M. ARG. *Prodr.* 1126.—*Erythrocarpus* BL. *Bijdr.* 604.—*Ceratophorus* SOND. in *Linnaea*, xxiii. 120.—H. BN. in *Adansonia*, iii. 164.

<sup>7</sup> Spec. ad 12. WIGHT, *Icon.* t. 1867 (*Gelonium*).—Miq. *Fl. Ind.-Bat. Suppl.* i. 452 (*Gelonium*). H. BN. in *Adansonia*, i. 252, 349; iii. 154.

<sup>8</sup> *Bijdr.* 620 (part.).—ENDL. *Gen.* n. 5800.—H. BN. *Euphorb.* 397, t. 19, fig. 26, 27 (nec 28).—M. ARG. *Prodr.* 1130.

sepals generally 5, imbricate. Stamens  $\infty$ ,<sup>1</sup> inserted on convex receptacle; filaments erect; anthers introrse apiculate, 2-rimose. Disk glandular, exterior to androecium, outwardly hirsute. Germen rudimentary central, 2-3-fid at apex, sometimes obsolete. Female calyx 5 or more rarely 5-6-merous. Disk shortly urceolate, often inwardly with  $\infty$  unequal stipitate staminodes. Germen 2-4-locular; ovule solitary obturated; style afterwards 2-4-lobed; lobes thick (coloured), stigmatiferous 2-fid. Fruit 2-4-coccous subdrupaceous; seeds pulpose-arillate.—A tall tree; leaves alternate, sometimes at apex falsely verticillate long petiolate, 2-stipulate, above the base 2-glandular, entire penninerved; flowers in axillary or superaxillary ramified-cymiferous corymbiform clusters; the female few central larger. (*Java, Malacca*.<sup>2</sup>)

47? **Acidocroton** GRISEB.<sup>3</sup>—Flowers monœcious, 5-6-merous; sepals imbricate. Petals contorted, rudimentary in female flower. Stamens  $\infty$ ,<sup>4</sup> free, inserted on eglandular slightly elevated receptacle (the apex being nearly where the rudimentary vestige of germen terminates); anthers introrse, 2-rimose; connective caudate; cells adnate. Germen 3-5-locular; style afterwards divided into 3-5 branches, fleshy-petaloid, canaliculate within, 2-fid; ovule solitary in cell. Capsule 3-5-coccous; seeds oblong-ovoid arillate at micropyle.—A diffuse shrub;<sup>5</sup> leaves alternate small crowded; stipules 2, lateral elongate, spinescent; flowers in unisexual branches terminal to pulviniform twigs, solitary or few cymose pedicellate. (*Cuba*.<sup>6</sup>)

48. **Ricinella** M. ARG.<sup>7</sup>—Flowers diœcious apetalous, 5-merous; calyx valvate. Disk adnate to calyx more or less perigynous; lobes opposite sepals. Stamens  $\infty$  (8-15), central free or 1-adelphous at base; anthers 2-locular, long affixed at middle, externally 2-rimose; connective narrow not produced. Germen rudimentary minute or 0, in female flower 3-locular; cells 1-ovulate; style short central, scarcely divided into 3 branches, internally papillose-laciniate. Capsule 3-coccous; seeds smooth subglobose exarillate; cotyledons foliaceous wider

<sup>1</sup> Sometimes sub-definite 10-15, of which 5 are alternisepalous, shorter; same number opposite longer.

<sup>2</sup> Spec. 1. *E. Tapos* BL, loc. cit.—MIQ. *Fl. Ind.-Bat.* i. p. ii. 412; Suppl. 460.

<sup>3</sup> *Fl. Brit. W.-Ind.* 42.—M. ARG. *Prodr.* 1042.

<sup>4</sup> Exterior alternipetalous.

<sup>5</sup> Aspect of *Securinea* spinescent.

<sup>6</sup> Spec. 1. *A. adelioides* GRISEB. loc. cit.—*A. Acidoton* L. (ex. M. ARG. *Prodr.* 924).

<sup>7</sup> In *Linnaea*, xxxiv. 153; *Prodr.* 729.—*Adelia* L. Gen. n. 1137 (part.).—ENDL. *Gen.* n. 5825 (part.).—H. BN. *Euphorb.* 417 (part.).

than long.—Unarmed shrubs or spinescent at apex of twigs; leaves alternate penninerved, entire or dentate pellucid punctulate; axil of secondary nerves depressed-glandular below, and pilose; flowers in fasciculate axillary pulvinules.<sup>1</sup> (*Trop. N. and S. America.*<sup>2</sup>)

49. **Bernardia** HOUST.<sup>3</sup>—Flowers monœcious or diœcious (nearly of *Ricinella*), 3–6-merous; male calyx valvate; female imbricate. Stamens  $\infty$ , central free; anthers 2-locular; cells subglobose short more or less adnate to receptacle, introrsely or laterally rimose. Germen (in male flower rudimentary minute or 0) 3-locular; cells alternating with interior sepals, 1-ovulate; style discrete at base and inserted round subhians vertex of germen, stigmatiferous 2-fid at apex. Fruit capsular; seeds exarillate.—Shrubs or undershrubs; indumentum simple or stellate; leaves alternate, sometimes minute squamiform, 2-stipulate; flowers spicate or subsolitary axillary; spikes simple or oftener the male alternate cymiferous or glomeruliferous, sometimes shortly subcapitate; bracts often closely imbricated; female 1-florous; male  $\infty$ -florous pedicels articulate.<sup>4</sup> (*Trop. America N. and S.*<sup>5</sup>)

50. **Adenophædra** M. ARG.<sup>6</sup>—Flowers diœcious (nearly of *Bernardia*) generally 3-merous; male receptacle eglandular. Stamens 3, alternating with valvate sepals (or more rarely 6); filaments inserted below small rudiment of gynœceum; anthers short, 2-rimose; connective at apex bearing large glands. Other characters of *Bernardia*.—Trees and shrubs; indumentum simple; leaves alter-

<sup>1</sup> A genus allied to *Acidocroton* and *Bernardia*, and hence to *Tournefortia*, *Echinus*, and *Acalypha*.

<sup>2</sup> Spec. 7, 8. L. *Amœn.* v. 410 (*Adelia*).—P. BR. *Jam.* 361 (*Bernardia* 2).—LAMK. *Dict.* i. 40 (*Adelia*).—RICH. *Fl. Cub.* 210 (*Adelia*).—SCHLT. in *Linnaea*, vi. 362 (*Adelia*).—SCHEELE, in *Linnaea*, xxv. 581 (*Tyria*).

<sup>3</sup> *Jam.* 361 (part. nec VILL.).—ADANS. *Fam. des Pl.* ii. 356.—M. ARG. in *Linnaea*, xxiv. 171 (part.); *Prodr.* 915 (part.).—H. BN. in *Adansonia*, xi. 102.—*Adelia* L. n. 1137 (part.).—J. GEN. 388 (part.).—H. BN. *Euphorb.* 417 (part.).—*Bivonia* SPRENG. *N. Entd.* ii. 116 (nec DC.).—*Traganthus* KL. in *Erichs. Arch.* (1841), 188, t. 9 A.—H. BN. *Euphorb.* 503.—*Tyria* KL. ex ENDL. *Gen. Suppl.* iv. 88, n. 5787<sup>3</sup>.—*Phædra* KL. ex ENDL. *loc. cit.* n. 5787<sup>5</sup>.—*Polybæa* KL. ex ENDL. *loc. cit.* n. 5785<sup>5</sup>.—H. BN. *Euphorb.*

504.—*Passæa* H. BN. *Euphorb.* 507, t. 18, fig. 28–35.—*Alevia* H. BN. *op. cit.* 508.

<sup>4</sup> Allied to preceding genus differing by the insertion of the style.—Sect. 6, scil.: 1. *Tyria* (KL.).—2. *Polybæa* (KL.).—3. *Phyllopassæa* (M. ARG.).—4. *Traganthus* (KL.).—5. *Passæa* (H. BN.).—6. *Alevia* (H. BN.).

<sup>5</sup> Spec. ad 20. L. *Spec. ed.* 3, 1473 (*Croton*).—GEIS. *Crot. Monogr.* 15, 50 (*Croton*).—JACQ. *Sel. Stirp. Amer.* 254 (*Acalypha*).—W. *Spec.* iv. 553 (*Croton*).—KL. in *Hook. Journ.* (1843), 46 (*Traganthus*).—HOOK. et ARN. *Beech. Voy. Bot.* 309 (*Hermesia*?).—SCHLT. in *Linnaea* (1832), 386 (*Acalypha*).—A. RICH. *Cuba*, 209 (*Adelia*).—GRISEB. *Pl. Wright.* 159; *Fl. Brit. W.-Ind.* 45.—H. BN. in *Adansonia*, iv. 372, t. 10, 11 11 (*Adelia*).

<sup>6</sup> In *Mart. Fl. Bras. Euphorb.* (afterwards taken out of common order).

nate ; inflorescence nearly (longer and more slender) of *Bernardia*.<sup>1</sup> (*Trop. South America*.<sup>2</sup>)

51. **Acidoton** Sw.<sup>3</sup>—Flowers monœcious apetalous ; male sepals 3-5-valvate. Stamens  $\infty$ , the elongated-conical thick receptacle dilated externally in a spurious-alveolate disk between the filaments at the base ; filaments, etc., free ; anthers extrorse, shortly apiculate ; cells discrete at base, rimose. Female calyx 4-5-partite ; lobes valvate or subimbricate, scarcely or not contiguous. Germen 3-locular ; ovules solitary ; style erect rather thick, divided at apex into 3 branches simple, erect-patulous, stigmatiferous within. Fruit capsular ; seeds exarillate.—A shrub glabrous or more or less sprinkled with pellucid stinging hairs ; leaves alternate petiolate, stipulate, simple, entire or paucidentate penninerved veined ; flowers spicate-racemose ; racemes 1-sexual ; male axillary few-flowered ; the female longer, axillary and terminal, naked at base.<sup>4</sup> (*Jamaica*.<sup>5</sup>)

52. **Cleidion** BL.<sup>6</sup>—Flowers monœcious or diœcious apetalous ; male calyx valvate. Stamens  $\infty$ , inserted on conical or hemispherical receptacle, alternate verticillate and in vertical distinct series ; filaments free ; anthers seriato-imbricate compressed inserted at summit of subulate peltate filaments or slightly above the base ; connective (coloured) peltiform, bearing at the margin 4 small cells, afterwards suberuciate confluent-rimose, mucicous or apiculate above. Female sepals 3-5, imbricated or 4, decussate-imbricate. Germen free, sometimes surrounded by hypogynous disk (*Discoeleidion*<sup>7</sup>) ; cells 3 (*Redia*<sup>8</sup>) or more rarely 2 (*Lasiostyles*<sup>9</sup>), opposite exterior sepals, 1-ovulate ; style branches 2, 3, linear-elongate, more or less deeply 2-fid, densely papillose stigmatiferous within. Capsule 2-3-coccous ;

<sup>1</sup> A genus imperfectly known to us, formerly regarded as a section of *Bernardia* (M. ARG. in *Linnæa*, xxxiv. 172). Male flower nearly of *Tragia*.

<sup>2</sup> Spec. ad 2. Kl. in *Hook. Lond. Journ.* ii. (1843), 46 (*Tragia*).—M. ARG. *Prodr.* 918 (*Bernardia*).

<sup>3</sup> *Prodr.* 83 ; *Fl. Ind. Occ.* ii. 952, t. 18.—A. JUSS. *Euphorb.* 32.—ENDL. *Gen.* n. 5822.—H. BN. *Euphorb.* 401, t. 18, fig. 10, 11.—M. ARG. *Prodr.* 914.

<sup>4</sup> A genus allied to *Bernardia*, differing by styles not discrete at base.

<sup>5</sup> Spec. 1. *A. urens* Sw. *loc. cit.*—GRISEB. *Fl. Brit. W.-Ind.* 45 ; *Cat. Pl. Cub.* 18.—*A. innocuus* H. BN. *op. cit.* 402.—*Urtica*, SLOAN, *Jam* i. 125 ;

t. 83, fig. 1.

<sup>6</sup> *Bijdr.* 612.—ENDL. *Gen.* n. 5795.—H. BN. *Euphorb.* 404, t. 9, fig. 3-5.—M. ARG. in *Linnæa* xxxiv. 183 ; *Prodr.* 983 (incl. : *Lasiostyles* PRESL, *Psilostachys* TURCZ. *Redia* CASAR.).

<sup>7</sup> M. ARG. in *Flora* (1864), 481 ; *Prodr.* 984, sect 1.

<sup>8</sup> CASAR. *Stirp. Bras. Dec.* vi. 51.—ENDL. *Gen. Suppl.* v. 89.—H. BN. *Euphorb.* 407, t. 21, fig. 1, 2.—*Psilostachys* TURCZ. in *Bull. Soc. Mosc.* (1843), 581, in *Flora* (1844), 121.

<sup>9</sup> PRESL *Bot. Bem.* 159.—ENDL. *Gen.* n. 5795<sup>1</sup>.—H. BN. *Euphorb.* 653.—*Euclidion* M. ARG. in *Linnæa*, xxxiv. 184 ; *Prodr.* 987 sect 3.

seeds subglobose exarillate. (*Asia, Oceania, Africa and Trop. America*.<sup>1</sup>)

53. **Endospermum** BENTH.<sup>2</sup>—Flowers diœcious apetalous. Male calyx gamophyllus, unequally 3-5-denticulate, at first slightly imbricate. Stamens 6-10, 2-seriate verticillate inserted on erect central column; filaments free recurved at apex; anthers extrorse peltate, 3-4-valved. Disk vaginiform clothing base of androceum column. Germen rudimentary placed at summit of column. Calyx unequally 4-5-dentate. Germen 2-locular, outwardly surrounded by hypogynous disk; style afterwards divided into 2 stigmatiferous lobes, diskiform subsessile and alternately connate. Ovule solitary in cells; micropyle extrorse superior obtected with marginal denticulate obturator. Fruit 2-merous, indehiscent; mesocarp thin, finally separating from permagentaceous endocarp; columella 0; testa of exarillate seeds hard, outwardly aculeate-rugose.—Trees; leaves<sup>3</sup> alternate petiolate; 2-stipulate, penninerved or at base sub-3-plinerved reticulate-venose, sometimes below base of limb largely 2-glandular; indumentum stellate; flowers in racemes or spikes axillary elongated cymuliferous. (*China, Malaisia, Borneo*.<sup>4</sup>)

54. **Erismanthus** WALL.<sup>5</sup>—Flowers monœcious, apetalous. Male calyx oblique with compressed receptacle elongated; folioles 5, very unequal imbricated; the posterior larger. Stamens 8-15; filaments central free; anthers introrse obtusely marginate; cells adnate, introrsely rimose. “Female sepals 5, widely foliaceous, imbricated. Germen 3-locular; ovules<sup>6</sup> in cells 1, with obturator; style 3-fid; branches 2-partite stigmatiferous hirtus-papillose at apex. Fruit...?”—A shrub, as appears, scandent; leaves opposite subsessile penninerved, male flowers in axils of leaves or at summit of twigs in an ovoid subsessile amentum; bracts of amentum crowded, imbricate, 1-florous; flowers shortly pedicellate, laterally 2-bracteolate; “female in axillary peduncles paucibracteate, terminal and solitary.” (*Ins. Penang*.<sup>5</sup>)

<sup>1</sup> Species about 12, of which some six are from warm, S.) MIQ. *Fl. Ind.-Bat.* i. p. ii. 209.—THW. *Rum. Pl. Zeyl.* 272.—DALZ. in *Hook. Journ.* (1851), 229 (*Rottlera*).—H. BN. in *Adanson* ii. 218; iv. 270; xi. 129.

<sup>2</sup> *Fl. Hongkong.* 304.—M. ARG. *Prodr.* 1131.

<sup>3</sup> By some referred to *Aleurites* on account of entire leaves and nervation.

<sup>4</sup> Spec. ad 4, 5. M. ARG. in *Flora* (1864),

469.

<sup>5</sup> Cat. n. 8011.—H. BN. *Euphorb.* 669 (*Erismanthus*).—M. ARG. *Prodr.* 1138.

<sup>6</sup> “Omnino euphorbiaceo.” (M. ARG.)

<sup>7</sup> Habit scarcely of *Euphorbiaceæ*; the wide unequal base of the leaves does not indicate a subauriculate branch.

<sup>8</sup> Spec. 1. *E. obliquus* WALL. loc. cit.



55? **Ditta** GRISEB.<sup>1</sup>—Flowers diœcious; male . . . ? Disk and calyx of female flowers 0. Germen 2-locular; ovule in cells 1 (of Euphorbiaceæ); branches of thick style short, 2-partite; erect slightly conical. Fruit drupaceous-capsular without columella; seeds scrobiculate exarillate.—A glabrous resinous shrub;<sup>2</sup> leaves alternate spatulate-lanceolate dentate-crenate penninerved articulate-veined, shortly petiolate, 2-stipulate; flowers axillary, congesto-glomerulate on common peduncle; pedicels imbricate-bracteolate below flower; bracts opposite few, entire or the lower palmate-2, 3-partite.<sup>3</sup> (*Cuba*.<sup>4</sup>)

56. **Adriana** GAUDICH.<sup>5</sup>—Flowers diœcious apetalous eglandular; male calyx 3–5-partite, valvate. Stamens  $\infty$ , inserted on shortly conical receptacle; filaments short erect; anthers adnate, extrorsely 2-rimose, connective produced beyond cells, entire or serrate, acuminate. Sepals in female flowers 3–8, imbricated. Germen 3-locular; ovules solitary; branches of scarcely 3-partite style long 2-fid linear densely stigmatiferous. Capsules 3-coccous, verrucose-rough; seeds arillate foveolate albuminous.—Shrubs; indumentum stellate,<sup>6</sup> sometimes scanty; leaves opposite (*Trachycaryon*<sup>7</sup>) or oftener alternate (*Euadriana*<sup>8</sup>), entire lobed or dentate; stipules often glanduliform; flowers entire lobed or dentate; stipules often glanduliform; male flowers interrupted-glomerate-spicate; female racemose. (*Australia*.<sup>9</sup>)

57? **Neoboutonia** M. ARG.<sup>10</sup>—Flowers diœcious apetalous; male calyx 2-partite, valvate. Stamens  $\infty$ , central; filaments free inserted on convex pilose receptacle; anthers basifixed; cells adnate introrse, rimose. Female calyx quincuncially-imbricate. Germen 3-locular; style branches 3, 2-partite. Fruit . . . ?—A tree or shrub (?); indumentum stellate radians; leaves alternate long petiolate, entire or repando-sublobed, 7–9-nerved reticulate veined; flowers terminal and axillary; male<sup>11</sup> in compound ramified spikes; female spicate-racemose. (*Trop. West. Africa*.<sup>12</sup>)

<sup>1</sup> *Pl. Wright.* 160.—M. ARG. *Prodr.* 1138.

<sup>2</sup> In some respects with the habit of *Myricaria*.

<sup>3</sup> A genus of uncertain position placed here in *Prodrum*.

<sup>4</sup> Spec. 1. *D. myricoides* GRISEB. *loc. cit.*

<sup>5</sup> In *Ann. Sc. Nat.* sér. 1, v. 223; in *Freyein. Voy. Uran. Bot.* 486, t. 116.—ENDL. *Gen. n.* 5820.—H. BN. *Euphorb.* 405, t. 2, fig. 19–22; t. 18, fig. 12.—M. ARG. *Prodr.* 890.

<sup>6</sup> In calyx often simple.

<sup>7</sup> KL. in *Lehm. Pl. Preiss.* i. 175.—*Crototerum DESVX.* herb. (ex H. BN.).

<sup>8</sup> H. BN. *Euphorb.* 406 (sect. including 1 species, very variable, F. MUELL. *Trans. Soc. Bot. Edinb.* vii. 482).

<sup>9</sup> Spec. 3, v. 4, 5. LABILL. *Pl. Nouv.-Holl.* ii. 73, t. 223 (*Croton*).—HOOK. in *Mitch. Trop. Austral.* 124, 371.—F. MUELL. in *Hook. Journ.* viii. (1856), 209; in *Trans. Phil. Soc. Viet.* i. 16.—BENTH. *Fl. Austral.* vi. 133.—H. BN. in *Adansonias*, vi. 311.

<sup>10</sup> In *Seem. Journ. of Bot.* i. 336; *Prodr.* 892.

<sup>11</sup> Minute.

<sup>12</sup> Spec. 1. *N. africana* M. ARG. *loc. cit.*

58. **Trewia** L.<sup>1</sup>—Flowers diœcious apetalous; receptacle shortly conical. Male sepals 3, 4, free or connate at base, valvate. Stamens  $\infty$ ; filaments free or connate at base; anthers erect, 2-locular; exterior usually extrorse; others introrse or laterally rimose. Female calyx 3–4-merous, valvate or slightly imbricate at apex, gamophyllous at base afterwards unequally-broken, sometimes reflexed at anthesis. Germen sessile; cells 3, 4, 1-ovulate; micropyle extrorse superior obtected by obturator; style erect, afterwards divided into 3, 4, elongate, inwardly stigmatiferous, much papillose branches. Fruit indehiscent suberose; endocarp hard subosseous; seeds exarillate glabrous copiously albuminous.—A tree; leaves opposite or subalternate petiolate, 2-stipulate, penninerved, digitinerved at base; stipules linear-subulate, very caducous; flowers racemose or spicate.<sup>2</sup> (*Southern Asia cont. and ins.*<sup>3</sup>)

59 ? **Lasiocroton** GRISEB.<sup>4</sup>—Flowers diœcious apetalous; calyx 5-partite, valvate. Stamens  $\infty$ , central, inserted on rather convex receptacle; filaments free; anthers erect, 2-locular, longitudinally rimose. Germen 3-locular, surrounded at base with thick hypogynous disk; cells 1-ovulate; style branches 3, short thick, inwardly sulcate, inflexed lobulate at margin. Capsules depressed-globose, 3-dymous; seeds smooth exarillate.—A tree; leaves alternate petiolate penninerved, digitinerved at base, reticulate-veined tomentose; hairs simple ferruginous; male flowers in short densely glomerate spikes; female in elongated racemes naked below. (*Jamaica.*<sup>5</sup>)

60. **Pycnocomia** BENTH.<sup>6</sup>—Flowers monœcious (nearly of *Echinus*); male calyx 3–5-partite, valvate. Stamens  $\infty$ ; filaments

<sup>1</sup> *Gen.* 152.—LINDL. *Nat. Syst.* ed. 2, 174; *Veg. Kingd.* 174.—KL. in *Ericks. Arch.* vii. 259.—ENDL. *Gen. Suppl.* iii. 98.—H. BN. *Euphorb.* 408, t. 18, fig. 18–23.—M. ARG. *Prodr.* 953.—*Rottlera* W. in *Gætt. Diar. Hist. Nat.* i. 8, t. 3 (nec ROXB.).—*Tetragastris* GÆRTN. *Fruct.* ii. 130, t. 109, fig. 5.

<sup>2</sup> A genus scarcely sufficiently distinct from *Echinus* on account of its gynœceum and non-capsular fruit.

<sup>3</sup> One species very similar, viz., *T. nudiflora* L. *Spec.* ed. 3, App. 1661.—*T. macrophylla* ROTH, *Nov. Pl.* 373.—*T. macrostachya* KL. *Reis. Pr. Waldem.* 117, t. 23.—*Tetragastris ossea* GÆRTN. *loc. cit.*—*Rottlera indica* W. *loc. cit.*—A. JUSS. *Euphorb.* t. 9, fig. 29 C.—*E. Hoperviana*, BL. *herb.*—*Caschi* RHEED. *Hort. Malab.* i. 76, t. 42.

<sup>4</sup> *Fl. Brit. W.-Ind.* i. 46 (part.).—M. ARG.

*Prodr.* 955 (part.).

<sup>5</sup> *Spec.* 1. *L. macrophyllus* GRISEB. *loc. cit.*—*Croton macrophyllus* SW. *Prodr.* 100; *Fl. Ind. Occ.* 1196.—W. *Spec.* iv. 549.—GEIS. *Crot. Mon.* 54. *Spec. altera*, scil. *L. prunifolius* GRISEB. (in *Nachr. d. Kæn. Ges. Gætt.* (1865), 175.—*Croton prunifolius* VAHL, ex GEIS. *Mon.* 47) seen by us in the herbarium of Lambert, it would seem not to be of this genus, but much rather a true species of *Croton*; indumentum of leaves and germen lepidote; style branches 2-fid. Whence *L. macrophyllus* appears allied to *Mabea* and *Echinus*, thence to *Ricinella*, *Bernardia* (and *Pseudocroton* ?) Flowers and fruit, as in *Tournefortia* colouring water a purple-violet.

<sup>6</sup> *Niger*, 508.—H. BN. *Euphorb.* 410.—M. ARG. *Prodr.* 950.

free inserted on convex receptacle glandular-incrassate and alveolate-cingent between their bases in bud straight or more or less plicate flexuose; anther 2-locular rimose; inferior introrse, others introrse or oftener extrorse. Female calyx often 5-partite, quineuncially imbricated. Germen 3-locular; ovules solitary; style erect, afterwards 3-fid; branches entire recurved or revolute, incrassate at apex or subpellate and inwardly densely stigmatiferous. Capsule 3-coccous; seeds albuginous exarillate smooth subglobose.—Trees or shrubs; leaves alternate (large) elongate penninerved exstipulate, articulate at base; flowers in axillary or subterminal racemes 1 or 2-sexual bracts 1- or cymose-pluriflorous; female flower often 1, terminal.<sup>1</sup> (*Trop. West. Africa, Malacassia.*<sup>2</sup>)

61? **Mabea** AUBL.<sup>3</sup>—Flowers monœcious apetalous eglandular, receptacle rather convex. Sepals 4–6, free or shortly connate at base, valvate or subimbricate,<sup>4</sup> afterwards not contiguous. Stamens  $\infty$ ; filaments erect, short, slightly dilated, subrecurved at apex; anthers extrorse; cells adnate rimose. Female sepals 5, 6, 2-seriate imbricate. Germen sessile, 3-locular; cells 1-ovulate; style long conical, 3-fid at apex; branches inwardly stigmatiferous recurved or revolute. Capsules 3-coccous; seeds arillate at superior micropyle.—Trees or shrubs, often scandent; leaves alternate 2-stipulate shortly petiolate simple penninerved denticulate; limb sometimes 2-glandular at base; flowers generally racemose; inferior female few or 0; female bracts 1-florous; male 1– $\infty$ -florous, furnished at base with 2 glands laterally elongate large thick (coloured); male pedicels cymose, free or more or less high common stipitate.<sup>5</sup> (*Warm America.*<sup>6</sup>)

62. **Conceveiba** AUBL.<sup>7</sup>—Flowers diœcious apetalous; male calyx 3, 4-partite, valvate. Stamens  $\infty$ , inserted on the rather

<sup>1</sup> Genus scarcely distinct from *Echinus* by its disciferous receptacle, habit and inflorescence.

<sup>2</sup> Spec. about 8. H. BN. in *Adansonia*, i. 69, 256; xi. 176.—M. ARG. in *Flora* (1864), 483.

<sup>3</sup> *Guian.* 867, t. 334.—J. GEN. 388.—POIR. *Dict.* iii. 663.—LAMK. *Ill.* t. 773.—A. JUSS. *Euphorb.* 40, t. 13.—ENDL. *Gen.* n. 5798.—H. BN. *Euphorb.* 412, t. 13, fig. 19–28.—M. ARG. *Prodr.* 1148.

"Lacinie calicis utriusque sexus imbricativæ." (ARG.).

<sup>4</sup> Gen. placed between *Hippomane* and *Exœcaria* in *Prodromus*.

<sup>5</sup> Spec. about 15. MART. *Reis.*; in *Linnaea* (1830), 39.—BENTH. *Sulph.* 165; in *Hook. Journ.* (1854), 364.—M. ARG. in *Flora* (1872), 44.—H. BN. in *Adansonia*, iv. 370.

<sup>7</sup> *Guian.* ii. 923, t. 353.—A. JUSS. *Euphorb.* t. 13, fig. 42 B.—BENTH. in *Hook. Journ.* (1854), 331.—H. BN. *Euphorb.* 414, t. 21, fig. 12, 13.—M. ARG. in *Linnaea* xxxiv. 166; *Prodr.* 895 (part.).—*Conceveibum* RICH. (ex A. JUSS. *op. cit.* 43).

convex central receptacle sometimes 5-glandular at base (*Conceveiba*<sup>1</sup>); filaments unequal; the exterior shorter erect; the interior elongate, contorto-plicate or corrugate in bud; some central antherless; anthers usually introrse or partly extrorse; sometimes all extrorse (*Veconceiba*<sup>2</sup>), short rimose, sometimes connective produced above beyond cells. Female calyx 5-10-partite, imbricate; the exterior or all the leaves furnished outwardly at base with 2 thick glands (like bracts). Germen 3-locular; ovules solitary; styles thick short erect, afterwards in three lobes, dilatato-reflexed, stigmatiferous 2-dentate or 2-fid at apex. Fruit capsular, 3-agonal; exocarp thick; cocci lignescent subcrustaceous, 1-spermous; seeds arillate at micropyle.—Trees; leaves alternate petiolate, stipulate subentire, penninerved or at base 3-5-plinerved, coriaceous reticulate-veined, stellate-pubescent below and fuscate-glandular-punctate; flowers terminal; the male in ramified glomeruliferous spikes; the female in thicker spikes, sometimes glomeruliferous; bracts laterally thickly 2-glanduliferous. (*Trop. America*,<sup>3</sup> *Trop. W. Africa*.<sup>4</sup>)

63 ? **Gavarretia** H. BN.<sup>5</sup>—Flowers diœcious (nearly of *Conceveiba*); the male unknown. Female calyx gamophyllous urceolate strictly encircling long germen truncate at mouth, entire or obscurely 4-dentate, valvate. Germen 2-locular; ovules solitary; micropyle obturated; style erect nearly from base 2-partite; lobes 2-fid recurved patent subulate papillose subequal to germen. Fruit . . . ?—A tree (?); leaves alternate petiolate stipulate obovate, minutely glanduliferous on both sides below; female flowers in terminal spikes; bracts 1 or few flowered, minutely 2-glandular at base.<sup>6</sup> (*North Brazil*.<sup>7</sup>)

64. **Macaranga** DUP.-TH.—Flowers diœcious apetalous; male calyx valvate. Stamens  $\infty$ , sometimes few or subsolitary; filaments central situated on rather convex eglandular receptacle; anthers

<sup>1</sup> M. ARG. in *Flora* (1864), 530.

<sup>2</sup> M. ARG. in *Linnaea*, xxxiv. 167.

<sup>3</sup> Spec. 4. SPRENG. *Syst.* iii. 901 (*Conceveiba*).—BENTH. *loc. cit.* 332.—H. BN. in *Adansonia*, v. 221.

<sup>4</sup> Spec. 1. *C. Africana* M. ARG. in *Flora* (1864), 530; *Prodr.* 897, n. 7.

<sup>5</sup> In *Adansonia*, i. 185, t. 7, fig. 3, 4.

<sup>6</sup> A genus reduced by ARG. to a section of *Conceveiba*. Whether sufficiently distinct?

<sup>7</sup> Spec. 1. *G. terminalis* H. BN. *loc. cit.* —*Conceveiba terminalis* M. ARG. in *Linnaea*, xxxiv. 167; *Prodr.* 897, n. 5.

<sup>8</sup> *Gen. Nov. Madag.* 26, n. 88.—A. JUSS. *Euphorb.* 43.—ENDL. *Gen.* n. 5789.—H. BN. *Euphorb.* 431, t. 21, fig. 5-9.—M. ARG. *Prodr.* 987 (incl.: *Adenoceras* REICHB. F. et ZOLL. *Adisca* ZOLL. *Mappa* A. JUSS. *Mecostylis* KURZ, *Pachystemon* BL. *Panhopia* NON. *Pseudo-Rottlera* ZOLL. et REICHB. F.).—BAKER, *Fl. Maurit.* 306.

subpeltate at back. Cells 3 (*Pachystemon*<sup>1</sup>) or constantly 4 (*Eumacarang*a,<sup>2</sup> *Mappa*<sup>3</sup>), sometimes anthers heteromorphous, partly 3 or 4 (*Dimorphanthera*<sup>4</sup>); valves in dehiscence extrorse same in number (3 or 4). Female calyx imbricate. Germen free; cells 1 (*Eumacarang*a), 2 (*Mappa*) or partly 2, 3 (*Dimorphanthera*), sometimes 4-6 (*Pachystemon*); 1 ovule in each, descendent; more or less anatropous; micropyle extrorse superior; obturator generally small; the more or less lateral branches of central or excentric style equal in number to cells (*Eumacarang*a) inwardly and at apex laterally stigmatiferous. Fruit capsular, 1-6-coccous; cocci dehiscent or indihescent, outwardly unarmed or more or less aculeate, often (as several parts of the plant) sprinkled with granular punctiform, red, yellow, or ferruginous glands. Seed usually incompletely anatropous, placenta laterally adnate to elongate linear hilum, exarillate; the foliaceous cotyledons of albuminous embryo much longer and wider than radicle.—Trees or shrubs; leaves usually alternate petiolate; stipules lateral, sometimes large foliaceous or membranous; limb entire or lobed, penninerved or at base palmatinerved reticulate-veined; flowers (male) minute glomerulate or cymose in subsimple or more or less ramified axillary racemes, involucre with small or sometimes large foliaceous bracts. (*All Trop. Regions of the Old World*<sup>5</sup>).

65. **Dysopsis** H. BN.<sup>6</sup>—Flowers monœcious apetalous; male calyx valvate 3-fid. Stamens 3 or oftener 6, 2-seriate inserted on short receptacle; filaments central, connate at base; anthers introrse or in smaller stamens<sup>7</sup> sublateral; cells divergent below and free at middle between themselves. Female flowers (nearly of *Mer-*

<sup>1</sup> BL. *Bijdr.* 626.—ENDL. *Gen.* n. 5778.—H. BN. *Euphorb.* 551, t. 20, fig. 38-41.—M. ARG. in *Mém. Gen.* xvii. p. ii. 454.

<sup>2</sup> M. ARG. *Prodr.* 1008, sect. 4.—*Macarang*a DUF.-TH. *loc. cit.*—*Panhopia* NOR MSS. (ex DUF.-TH. *loc. cit.*)—*Bruea* GAUDICH. in *Freycin. Voy. Bot.* 511.—H. BN. in *Adansonia*, vii. 96.—*Me-costylis* KURZ, in *Plysm. et Binn. Pl. Nov. Hort. Bog.* 30.

<sup>3</sup> A. JUSS. *Euphorb.* 44, t. 14, fig. 44.—ENDL. *Gen.* n. 5788.—H. BN. *Euphorb.* 428, t. 20, fig. 1-7.

<sup>4</sup> M. ARG. *Prodr.* 990, sect. 2.

<sup>5</sup> Spec. ad 80. L. *Spec. ed.* 2, 1430 (*Ricinus*).—W. SPEC. iv. 526 (*Acalypha*).—ROXB. *Fl. Ind.* iii. 690 (*Ricinus*).—BL. *Bijdr.* 248 (*Zanthoxylon*).—BLANCO, *Fl. de Filip.* ed. 2, 517 (*Croton*).—

WIGHT, *Icon.* t. 1883, 1949.—REICHB. et ZOLL.

VOL. V.

in *Linnaea*, xxviii. 311 (*Rottlera*).—REINW. *Cat. Bog.* 108 (*Ricinus*).—ZOLL. in *Linnaea*, xxix. 464 (*Adisca*), 465 (*Mappa*).—HASSK. *Hort. Bog.* 238 (*Rottlera*).—Miq. *Fl. Ind.-Bat.* i. p. ii. 403; *Suppl. Sumat.* 456 (*Mappa*).—THW. *Enum. Pl. Zeyl.* 273 (*Rottlera*).—M. ARG. in *Linnaea*, xxxiv. 197; in *Flora* (1864), 466; in *Seem. Journ. of Bot.* i. 337 (*Mappa*).—BENTH. *Fl. Austral.* vi. 144.—H. BN. in *Hortic. Franc.* xv. 234; in *Adansonia*, i. 69, 260, 349 (*Mappa*); ii. 223 (*Mappa*); iii. 155 (*Mappa*); vi. 316 (*Mappa*).

<sup>6</sup> *Euphorb.* 435; in *Adansonia*, xi. 128.—M. ARG. *Prodr.* 949.—Molina C. GAY, *Fl. Chil.* v. 345, t. 61 (not PAY. nor LESS. nor CAV.).—*Mirabellia* BERT. MSS.

<sup>7</sup> Exterior.

*curialis*); calyx valvate or slightly imbricated, 3-partite. Gynæceum as in *Mercurialis*. Germen cells 3, alternating with sepals, 1-ovulate; style branches linear-lanceolate, stigmatiferous within. Capsule 3-coccous; seeds subglobose scantily arillate.—Humble herbs prostrate thin-stemmed scandent; leaves alternate membranous, crenate-dentate or lobed, 2-stipulate;<sup>1</sup> flowers axillary with rudimentary twigs; male solitary or few; female solitary, finally much longer pedunculate.<sup>2</sup> (*Chili, Equatorial Andes, Magellan Alps, Island of J. Fernandez*<sup>3</sup>).

66. *Mercurialis* T.—Flowers monœcious or diœcious, apetalous, usually 3-merous; male calyx valvate. Stamens definite (*Trismegista*,<sup>5</sup> *Seidelia*<sup>6</sup>), alternating with sepals (2, 3) or subindefinite, usually  $\infty$  (*Linozotis*,<sup>7</sup> *Claoxylon*,<sup>8</sup> *Erythrocoeca*<sup>9</sup>); filaments central free inserted on rather convex receptacle; anther cells 2, rimose, free, from the first (*Claoxylon*) or more or less late erect; sometimes but rarely adnate to the connective (*Seidelia*, *Adenocline*). Glands 0 or  $\infty$  (possibly glanduliform staminodes?) inserted on receptacle usually exterior to fertile stamens. Female calyx valvate or slightly imbricated. Germen 2–3-locular; cells 1-ovulate; style branches same in number, papillose stigmatiferous within. Glands of hypogynous disk alternating with germen cells and equal in number to them, either linear (*Linozotis*) or more or less widely squamiform, sometimes very small (*Claoxylon*). Fruit 2–3-coccous; seeds thinly arillate at micropyle or more rarely on both sides.—Herbs or undershrubs sometimes small shrubs (*Erythrocoeca*), shrubs or trees

<sup>1</sup> Small, insignificant, greenish.

<sup>2</sup> A genus very nearly allied to *Mercurialis*.

<sup>3</sup> Spec. 1. *D. glechomoides* M. ARG.—*D. Gay-and* H. BN. *loc. cit.*—*Hydrocotyle glechomoides* RICH. *Mon. Hydrocot.* n. 14, t. 58, fig. 17.—DC. *Prodr.* iv. 170—*Boclesia crenata* DESVX.—*Mollina Chilensis* C. GAY.—*Mirabellia glechomoides* BERT. *Herb.*

<sup>4</sup> *Inst.* 534, t. 308.—ADANS. *Fam. des Pl.* ii. 354.—J. GEN. 385.—GERTN. *Fruct.* ii. 114, t. 107.—POIR. et DESROUSS. *Diet.* iv. 116; Suppl. iii. 665.—LAMK. *Ill.* t. 820.—SPACH, *Suit. à Buffon*, ii. 520.—ENDL. *Gen.* n. 5786.—A. JUSS. *Euphorb.* 46, t. 14, fig. 47.—NEES, *Gen. fasc.* 3.—PAYER, *Organog.* 525, t. 110.—H. BN. *Euphorb.* 488, t. 9, fig. 12–29; in *Adansonia*, iii. 175.—M. ARG. *Prodr.* 794 (incl.: *Adenocline* TURCZ. *Claoxylon* A. JUSS. *Erythrocoeca* BENTH. *Linozotis* ENDL. *Microcoeca* BENTH. *Paradenocline* M. ARG. *Seidelia* H. BN. *Trismegista* ENDL.).

<sup>5</sup> ENDL. *loc. cit.* b.—*Adenocline* TURCZ. in *Bull. Mosc.* (1843), 59; (1852), ii. 179.—H. BN.

*Euphorb.* 456, t. 9, fig. 6.—M. ARG. *Prodr.* 1139.—*Diplostylis* SEND. in *Linnaea*, xxiii. 113.—*Trianthema* SPRENG. MSS. (ex TURCZ. *loc. cit.*). Stamen cells in sect. often not free, but longitudinally adnate to connective on both sides.

<sup>6</sup> H. BN. *Euphorb.* 465, t. 9, fig. 7.—M. ARG. *Prodr.* 947 (*Tragie* sect. 11).

<sup>7</sup> ENDL. *loc. cit.* a.—H. BN. in *Adansonia*, iii. 175.—*Mercurialis* M. ARG. *Prodr.* 794.

<sup>8</sup> A. JUSS. *Euphorb.* 43, t. 14, fig. 43.—ENDL. *Gen.* n. 5790.—H. BN. *Euphorb.* 491, t. 20, fig. 20–24.—M. ARG. in *Linnaea*, xxxiv. 163; *Prodr.* 775 (incl.: *Athroandra* HOOK. f. in *Journ. Linn. Soc.* vi. 21; BAKER, *Fl. Maurië*, 317.—*Euclaoxylon* M. ARG. *Adenoclaoxylon* M. ARG. in *Flora* (1864), 436, *Discoclaoxylon* M. ARG. *loc. cit.* 437, *Gymnoclaoxylon* M. ARG. in *Linnaea*, xxxiv. 169)—*Erythrochilus* REINW. in *Bl. Bijdr.* 615.

<sup>9</sup> BENTH. *Niger*, 506.—H. BN. *Euphorb.* 437, t. 21, fig. 10.—M. ARG. *Prodr.* 790.—*Erythranthe* H. BN. *Euphorb.* 490.

(*Claoxylon*); leaves opposite (*Linozostis*) or alternate;<sup>1</sup> stipules membranaceous or glandular, sometimes indurate and spinescent (*Erythrococa*); flowers<sup>2</sup> axillary or terminal, in simple or more or less ramified-cymiferous or more usually glomeruliferous spikes.<sup>3</sup> (*All warm and tem. reg. of the Old World.*<sup>4</sup>)

67. **Tetrorchidium** POEPP. and ENDL.<sup>5</sup>—Flowers dioecious, apetalous, 3-merous; male sepals valvate or slightly imbricate. Stamens 6,<sup>6</sup> in pairs opposite sepals; filaments free short, inserted below rudimentary gynæceum (sometimes wanting), each bearing at apex 4 discrete peltate finally ascendent cells, extrorsely rimose. Female calyx imbricated. Germen 3-locular; 1-ovulate, alternating with sepals; style branches short thick subsessile, reflexo-adpressed at summit of germen. Glands of disk 3, hypogynous linear subpetaloid, alternating with cells and sepals. Fruit capsular; columella small very little or scarcely evolute; cocci 3 or 2, 1-spermous; seeds short foveolate submembranaceous-arillate; embryo albuminous.—Trees and shrubs; leaves alternate, entire or crenate; petiole patelliform-glandiliferous on both sides below apex; flowers in spikes or racemes, female simple, male ramified-glomeruliferous; bracts patelliform 2-glandular. (*Trop. America Cont. and Antill.*<sup>7</sup>)

68. **Hasskarlia** H. BN.<sup>8</sup>—Flowers (nearly of *Tetrorchidium*) dioecious; male calyx valvate. Germen cells opposite sepals (hence alternating with glands of disk). Other characters as in *Tetrorchidium*.—A shrub; leaves alternate stipulate subentire penninerved; male flowers in spikes opposite leaves naked glomeruliferous, naked at base; female in 1 or few flowered cymes, opposite leaves.<sup>9</sup> (*Trop. West. Africa.*<sup>10</sup>)

<sup>1</sup> Like nearly the whole plant, dry, caulescent. Some parts imbued with blackish juice.

<sup>2</sup> Usually very small vivrescent; lutescent or more rarely purpureo-scent.

<sup>3</sup> Sect. in gen. 7 (H. BN.), scil.: 1. *Linozostis* (ENDL.); 2. *Trismegista* (ENDL.); 3. *Seidelia* (H. BN.); 4. *Paradocline* (M. ARG. *Prodr.* 1141); 5. *Claoxylon* (A. JUSS.); 6. *Athraandra* (HOOK. F.); 7. *Erythrococca* (BENTL.).

<sup>4</sup> Spec. ad 55. L. Spec. 1036, ed. 3, 1391 (*Tragia*).—THUNB. *Fl. Cap.* (ed. SCH.), 546 (*Acalypha*).—POIR. *Dict.* vi. 204 (*Acalypha*); Suppl. i. 132 (*Adelia*).—REICHB. *Icon. Fl. Germ.* fig. 4801-4804.—GREN. et GODR. *Fl. de Fr.* iii. 98.—COSS. *Pl. Crit.* 63.—STEB. et ZUCC. *Fl. Jap. Fam.*—MEISSN. in *Hook. Journ.* (1843), 557.—E. MEY. in *Linnaea*, iv. 237.—SOND. in *Linnaea*, xxiii. 111.—KUNZE in *Linnaea*, xx. 55; xxiv. 162.—BOJ. *Hort. Maur.* 284 (*Claoxylon*).—Miq.

*Fl. Ind.-Bat.* i. p. ii. 386 (*Claoxylon*).—HOOK. F. in *Journ. Linn. Soc.* vi. 20 (*Claoxylon*).—M. ARG. in *Linnaea*, xxxiv. 163; in *Flora* (1864), 318, 436; in *Seem. Journ.* i. 333 (*Claoxylon*).—H. BN. in *Adansonia*, i. 70 (*Micrococca*), 76, 125, 279, 350; ii. 227 (*Claoxylon*); iii. 158, 167; vi. 322.

<sup>5</sup> *Nov. Gen. et Spec.* iii. 23, t. 227.—ENDL. *Gen.* n. 5818<sup>1</sup>.—H. BN. *Euphorb.* 439, t. 21, fig. 14-18; in *Adansonia*, xi. 101.—ARG. *Prodr.* 1132 (*Tetrorchidium*).

<sup>6</sup> Or 3; anthers 4-celled (ARG.).

<sup>7</sup> Spec. ad 3. H. BN. in *Adansonia*, v. 225.—M. ARG. in *Flora* (1864), 538.

<sup>8</sup> In *Adansonia* i. 52; xi. 101.—ARG. *Prodr.* 774.

<sup>9</sup> A genus nearly allied to *Tetrorchidium*, differing by oppositisepalous ovary cells and oppositifolius inflorescence.

<sup>10</sup> Spec. 1. *H. didymostemon* H. BN. *loc. cit.*

69. **Acalypha** L.<sup>1</sup>—Flowers monœcious or diœcious, apetalous; male calyx usually 4-partite, valvate. Stamens  $\infty$ , sometimes subdefinite (8–12) inserted on convex receptacle; filaments free more or less compressed, attenuate at apex; anthers inserted below apex; cells often free descendent elongated-vermiform or subelavate. Female calyx 3–5-partite, subclavate or slightly imbricate. Germen 3-locular; cells (2 anterior) 1-ovulate; style branches 3, simple, rarely subentire, oftener 2-seriate long few or  $\infty$ -laciniiferous within. Capsules often shortly echinate or rugose; seed glabrous, punctulate or tuberculate, more or less (sometimes very little arillate at micropyle).—Herbs undershrubs or shrubs; leaves alternate usually petiolate; petiole 2-stipulate at base, often glanduliferous at apex; limb penninerved or 3–7-nerved at base, usually variously dentate, sometimes pellucid-punctulate; male flowers<sup>2</sup> usually axillary spicate; spikes amentiform glomeruliferous, often articulate at base, deciduous; female spicate in axile bracts solitary or often cymose (2, 3), sessile or more rarely pedicellate; female bracts much varied in form, usually dentate, variously evolute and mostly after fecundation accrescent, and more or less covering the fruit<sup>3</sup> like an involucre. (*All hot regions.*<sup>4</sup>)

70. **Alchornea** SOLAND.<sup>5</sup>—Flowers monœcious or oftener diœcious; male calyx 2–4-partite, valvate. Stamens 4–8, or more usually  $\infty$ ,

<sup>1</sup> *Gen.* n. 1082.—*J. Gen.* 390.—*GAERTN. Fruct.* ii. 115, t. 107.—*LAMK. Ill.* t. 789.—*POIR. Dict.* vi. 202 (part.).—*Suppl.* iv. 680.—*SCHKUMR. Handb.* t. 311.—*A. Juss. Euphorb.* 45, t. 14, fig. 46.—*ENDL. Gen.* n. 5787.—*H. BN. Euphorb.* 440 t. 20, fig. 13–19.—*M. ARG. Prodr.* 799.—*BAKER, Fl. Maurit.* 314.—*Caturus* L. *Gen.* n. 1491.—*A. Juss. loc. cit.* t. 45.—*Cupamen.* ADANS. *Fam. des Pl.* ii. 356 (part.).—*Usteria* DENNST. *Malab.* v. 5 (ex *ENDL.*).—*Gaturus* SPRENG. *Syst.* i. 362.—*Lygostachys* KL. in *Linnaea*, xix. 235.—*Odonteilma* TURCZ. in *Bull. Mosc.* (1848), 587.—*Calypotropatha* KL. in *Pet. Mossamb. Bot.* 97, t. 18.—*Gymnalypha* GRISEB. *Nor. Fl. Panam.* 1, n. 10.

<sup>2</sup> Generally minute; made very small, mostly virescent; style virescent, whitish or purplish conspicuous, sometimes large.

<sup>3</sup> *Sect.* 2 (*M. ARG.*); 1. *Linostachys* (KL.); 2. *Enacalypha* (*M. ARG. Prodr.* 803).

<sup>4</sup> *Spec.* ad 210. *RUMPH. Herb. Amboin.* iv. t. 37 (*Canda felis*).—*JACQ. Hort. Schæubr.* t. 243, 246; *lc. Rar.* t. 620.—*CAV. Icon.* t. 568–570.—*H. B. K. Nor. Gen. et Spec.* ii. 92.—*M. ARG. in*

*Linnaea*, xxxiv. 6; in *Flora* (1872), 25.—*BENTH. Fl. Austral.* vi. 131.—*H. BN. in Adansonia*, i. 72, 266, 350; ii. 224; iii. 156; v. 226; vi. 317.

<sup>5</sup> *Ex. Sw. Fl. Ind. Occ.* ii. 1153.—*POIR. Suppl.* i. 286.—*A. Juss. Euphorb.* 42, t. 13.—*ENDL. Gen.* n. 5796.—*H. BN. Euphorb.* 445, t. 20, fig. 8–12.—*M. ARG. in Linnaea*, xxxiv. 167; *Prodr.* 899.—*Caturus* LAMK. *Fl. Cochinch.* (ed. 1790), 612.—*Cladodes* LOUR. *loc. cit.* 574.—*Hermesia* W. *Spec.* iv. 809.—*Conceceibum* L. C. RICH. ex *A. Juss. Euphorb.* 42, t. 13, fig. 42.—*Celebogyne* SM. in *Ann. Nat. Hist.* iv. 68.—*ENDL. Gen. Suppl.* ii. 88.—*H. BN. Euphorb.* 416, t. 8.—*Schousbea* SCHUM. et THÖNN. *Beskr.* 449.—*Conceceiba* KL. in *Ericks. Arch.* (1841), 191 (nec *AUBL.*).—*Aparisthmium* *ENDL. Gen.* n. 5792.—*H. BN. Euphorb.* 467.—*Stipellaria* *BENTH. in Hook. Journ.* (1854), 2.—*Lepidoturus* *H. BN. Euphorb.* 448 (nec *BOJ.*).—*Laurembergia* *H. BN. op. cit.* 451.—*Oryflea* *H. BN. op. cit.* 452.—*Wetria* *H. BN. op. cit.* 409.—*Palissya* *H. BN. op. cit.* 502. (nec *ENDL.*).—*Bleckeria* *Miq. Fl. Ind.-Bat. Suppl.* 407.—*Pseudotrewia* *Miq. loc. cit.* 462.



central; filaments free or 1-adelphous at base; anthers introrse or extrorse. Female calyx 4-6-partite, imbricated. Germen surrounded by cupular disk (or 0) 2-3-locular; cells 1-ovulate; style more or less high or nearly to base 2-3-ramose; branches simple or 2-fid, sometimes 2-partite, more rarely rather wide or subpetaloid, stigmatiferous within. Capsule sometimes outwardly rather fleshy 2-3-locular; seeds smooth or tuberculate, exarillate or scantily arillate. —Trees or shrubs; leaves alternate stipulate penninerved or oftener 3-5-plinerved, entire or more rarely dentate or crenate;<sup>1</sup> flowers in cymiferous or glomeruliferous spikes or racemes; bracts often 2-glandular at base.<sup>2</sup> (*All hot regions*<sup>3</sup>).

71. *Mareya* H. BN.<sup>4</sup>—Flower (nearly of *Alchornea*), monœcious; male calyx 3-4-partite, valvate. Stamens  $\infty$ , or 8-20; filaments inserted on small glandular receptacle; anther cells free clavate pendulous from glandular connective, finally ascendent, extrorsely rimose; sepals of female 4, 5; the exterior 2, 3, subvalvate; the interior either 2 or sometimes others smaller, imbricated. Disk hypogynous evolute; lobes sometimes unequal membranous alternating with germen cells. Germen (in male flower sometimes but rarely rudimentary), sessile 3-locular; ovules solitary; style branches 3, oblong long papillose-stigmatiferous. Capsule 3-coccous; seeds smooth; micropyle not at all or slightly arillate.—A tree; leaves alternate, petiolate glandular-maculate, 2-stipulate; flowers crowded<sup>5</sup>, glomerate-spicate axillary; the female usually in central glomerules; others male. (*Trop. West Africa*.<sup>6</sup>)

72? *Cephalomappa* H. BN.<sup>7</sup>—Flowers monœcious apetalous; male calyx obconical, verruculose at apex, unequally 2-4-fid, valvate. Stamens 2-4 (oftener 3); inserted on common central stipes; other

<sup>1</sup> Limb below at base glandular 2-6 maculate, hence afterwards often sparingly maculate.

<sup>2</sup> Sect. (ex M. ARG.) 10, scil.: 1. *Palissya* (H. BN.); 2. *Wetria* (H. BN.); 3. *Conceveibum* (A. JUSS.); 4. *Stipellaria* (BENTH.); 6. *Orfilea* (H. BN.); 7. *Laurentbergia* (H. BN.); 8. *Sidalchornea* (M. ARG.); 9. *Cladodes* (LOUR.); 10. *Catebogyne* (SM.); 11. *Eualchornea* (M. ARG.).—To which may be added; 5. *Lepidoturus* (H. BN.) from its slightly carunculate seed generically separated in *Prodr.* (598) and (better?) 12. *Alchorneopsis* (M. ARG. *Prodr.* 764), an incompletely known stirps generically distinct by its free anther cells, unequal valves.

<sup>3</sup> Spec. ad 40. H. B. *Pl. Equin.* i. 162, t. 46.—MART. in *Flora* (1841), ii. Beibl. 31.—ROXB. *Fl.*

*Ind.* iii. 693 (*Sapium*).—PREF. et ENDL. *Nov. Gen. et Spec.* iii. 18, t. 221.—CASAR. *Nov. Stirp.* 24, n. 20.—BENTH. *Niger.* 507.—KIL. in *Hook. Journ.* (1843), 46.—GRISEB. *Fl. Brit. W.-Ind.* 46.—M. ARG. in *Scem. Journ.* i. 333 (*Lepidoturus*).—H. BN., in *Adansonia*, i. 73, 274, 285 (*Palissya*); v. 307 (*Aparisthium*); vi. 321 (*Cladodes*); xi. 175, n. 76.

<sup>4</sup> In *Adansonia*, i. 73. — M. ARG. *Prodr.* 792.

<sup>5</sup> Small, whitish, fragrant.

<sup>6</sup> One spec. *M. leonensis*, very variable.—*M. spicata*, H. BN. *loc. cit.* 74.—*M. micrantha* M. ARG. *loc. cit.*—*Acalypha leonensis* BENTH. *Niger*, 504.—*A. micrantha* BENTH. *loc. cit.* 505.

In *Adansonia*, xi. 130.

filaments 2-plicate-inflexed in bud, finally straight and long exserted, anther introrse in bud 2-rimose. Germen rudimentary central, inserted at summit of stipes between filaments either thinly and rather long or oftener shortly obconical papillose. Calyx of female flowers  $\infty$ -merous, sepals unequal, sub-free or more or less connate at base, valvate. Germen sessile 3-locular; style rather thick erect; branches 3, thick erect, unequally incised or sometimes 2-lobed, inwardly densely papillose-stigmatiferous; ovule solitary in cell. Fruit..?—A shrub or tree (?) simply and stellate-tomentose; leaves alternate petiolate penninerved; stipules small or deciduous; flowers at summit of twigs and in the axils of upper leaves loosely racemose; male capitate; capitules globose, in branches of lateral or terminal racemes pedunculate; female flowers solitary or few, rather thicker pedunculate in the same branches, lateral and inferior to the male, or more rarely superior.<sup>1</sup> (*Borneo* <sup>2</sup>).

73. **Ramelia** H. BN.<sup>3</sup>—Flowers monœcious apetalous; male calyx valvate, 2-3-partite. Stamens 2, 3, alternating with petals; central filaments free incurved; anthers introrse; cells adnate rimose. Female calyx 4-6-partite; leaves unequal rather thick acute, imbricated. Germen longer than calyx; cells 3 (anterior 1), or more rarely 4, 1-ovulate; style entire obconical at base infundibuliform<sup>4</sup> above,<sup>4</sup> 3-4-lobed; lobes connate at base thickly subpetaloid elongate 3-angular, stigmatiferous within and at margin. Capsule 3-4 coccous; cocci descendent; seeds scantily arillate at micropyle; albuminous embryo shorter and narrower.—A shrub; leaves alternate falsely verticillate penninerved; flowers in spikes axillary, lateral and terminal; spikes 1-sexual; male filiform remotely glomeruliferous; female thicker; bracts like sepals and 2-glanduliferous at base 1-florous; bractlets 2, lateral.<sup>5</sup> (*New Caledonia*.<sup>6</sup>)

74? **Caryodendron** KARST.<sup>7</sup>—“Flowers dicecious; male-calyx 3-4-partite, valvate. Stamens equal to calyx lobes in number and alternating with them; filaments free, evolute 4-lobed inserted round rudiment of gynæceum, thick gradually acuminate; anthers finally

<sup>1</sup> A genus therefore allied to *Alchornea* and *Ramelia*, whence near *Cephalocroton* (much better reduced to a sect. of this as formerly known).

<sup>2</sup> Spec. 1. *C. Beccoriana*, H. BN. loc. cit.

<sup>3</sup> In *Adansonia*, xi. 132.

<sup>4</sup> Representing a thick infundibuliform

corolla.

<sup>5</sup> A genus sometimes referred to *Alchornea* and hence to *Cleidion* differing by definite number of stamens and fabric of styles.

<sup>6</sup> Spec. 1. *R. codonostylis* H. BN. loc. cit.

<sup>7</sup> Fl. Columb. 91, t. 45.—M. ARG. Prodr.

exserted introrse; cells pendulous, saccate dilated below, shortly acuminate at apex. Disk perigynous annular. Female calyx 5-6-partite, imbricated. Germen 3-locular; cells 1-ovulate; style...?" Fruit<sup>1</sup> subligneous, indehiscent (?), albumen of thick seed oily (sapid); cotyledons of foliaceous embryo large.—A tree; wood hard; juice watery; leaves alternate large entire penninerved; stipules lanceolate entire; flowers terminal spicate; male spikes ramified subpyramidal; female simple bracteate; female pedicels finally thick short. (*N. Granada*.<sup>2</sup>)

75. **Platygyne** MERC.<sup>3</sup>—Flowers monœcious apetalous; male calyx 4-5-partite, valvate. Stamens subdefinite in number, usually 5-8; filaments free erect, inserted above the base of truncate-excavate and rufescent-strigose receptacle, slightly recurved at apex; anthers adnate extrorse; cells at base and apex discrete rimose. Female calyx unequally 5-7-phyllous; leaves imbricated or subvalvate. Germen 3-locular; cells 1-ovulate; style larger than germen erect-3-lobed from obconical base; lobes thick inwardly subangular-compressed, emarginate-2-lobed at apex, much lacerate-papillose within. Capsule 3-cocceous; seeds exarillate albuminous.—A volubile shrub, sprinkled with more or less urent rufescent hairs; stem sympodiale; leaves alternate penninerved dentate petiolate, rigidly stipulate; flowers terminating short oppositifolious or lateral twigs, usually oligophyllous; male racemose; female subspicate. (*Cuba*.<sup>4</sup>)

76. **Amperea** A. Juss.<sup>5</sup>—Flowers usually diœcious or more rarely monœcious, apetalous, 3-5-merous. Male sepals free or slightly connate at base, valvate. Disk membranous; glands lanceolate membranous 4, 5 (*Euamperea*<sup>6</sup>), or more rarely 0 (*Monotaxidium*<sup>7</sup>). Stamens central twice as numerous as the sepals, 2-seriate; filaments free or connate at base erect; anther cells sacciform pendulous from connective glandular-incrassate or cristate in bud; the oppositisepalous longer, extrorsely rimose; the alternisepalous shorter introrse. Female calyx 5-merous; leaves free or subfree imbricated.

<sup>1</sup> The shapeless nut of *Jugland* ovoid-globose smooth, shortly apiculate.

<sup>2</sup> Spec. 1. *C. orinocense* KARST. loc. cit.

<sup>3</sup> In *Ser. Bull. Bot.* i. 167.—H. BN. *Euphorb.* 453, t. 4, fig. 18-22.—M. ARG. *Prodr.* 913.—*Acanthocaulon* KL. in *Endl. Gen. Suppl.* v. 88 n. 6784<sup>1</sup>.

<sup>4</sup> Spec. 1. *P. pruriens*.—*P. urens* MERC. loc. cit.—*P. hexandra* M. ARG. (a name scarcely

appropriate, the flower being rarely 6-androus).—*Tragia hexandra* JACQ. *Amer.* 245, t. 173, fig. 63.—*T. pruriens* W. (ex. KL. in *Endl. Gen. loc. cit.*).

<sup>5</sup> *Euphorb.* 35, t. 10, fig. 22.—ENDL. *Gen.* n. 5813.—H. BN. *Euphorb.* 454, t. 14, fig. 1-9.—M. ARG. *Prodr.* 214.

<sup>6</sup> M. ARG. loc. cit. 214, sect. 2.

<sup>7</sup> M. ARG. loc. cit. 213, sect. 1.

Germen sessile, 3-locular; ovules solitary; micropyle extrorse superior obtected by rather thick obturator; style afterwards 3-partite; branches short, 3-lobed or sometimes 3-fid stigmatiferous at apex. Capsule 3-coccous, 6-valved; seeds albuminous; micropyle arillate; cotyledons of cylindrical embryo narrow semi-terete and subequal to radicle. — Undershrubs, usually spartoid; branches narrow compressed; leaves alternate, 2-stipulate, usually narrow subsessile; flowers <sup>1</sup> axillary; female cymose or glomerulate, sometimes solitary; male contracto-cymose. (*Australia*.<sup>2</sup>)

77 ? **Calycopeplus** PL.<sup>3</sup>—Flowers monœcious; male naked, 1-androus. Filament erect articulate at middle. Anthers 2-locular 2-rimose, inserted at summit of attenuated filament; clefts extrorsely spectant. Calyx of female flower 4- or oftener 6-lobed; the 3 interior lobes alternating with the exterior, imbricated. Germen sessile; cells 3, opposite interior sepals, 1-ovulate; style branches 3, stigmatiferous, entire or 2-lobed. Capsules 3-coccous; seeds glabrous, arillate at micropyle; embryo ?—Shrubs or undershrubs usually subaphyllous; juice milky; twigs angular; leaves opposite or verticillate; stipules lateral small; limb usually narrow usually 2, sometimes 3, 4-glanduliferous; flowers terminal and axillary in cymes; female 1, central. Male peripheral, inserted in axil of 3, 4 bracts, connate in involucre at base alternate with the same number of cupular stipules, simple or 2-plicate, cymose in the axil of each; cymes sometimes small generally 2-parous.<sup>4</sup> (*West Australia*.<sup>5</sup>)

78. **Cnesmone** BL.<sup>6</sup>—Flowers monœcious apetalous;<sup>7</sup> male calyx 3-fid shortly subturbinate at base. Stamens 3, alternate, inserted round germen rudimentary or subnil; filaments free; anthers introrse, 2-rimose; connective long produced beyond cells.

<sup>1</sup> Minute, virescent, more rarely bluish or reddish.

<sup>2</sup> Spec. 5, 6, AD. BA. in *Duperr. Voy. Coq. Bot.* t. 49.—A. RICH. *Voy. Astrol. Bot.* 53, t. 20.—SPRENG, *Syst.* iv. 109 (*Leptomeria*).—KL. in *Lehm. Pl. Preiss.* i. 176.—BENTH. *Fl. Austral.* vi. 8.—H. BN. in *Adansonia*, vi. 318.

<sup>3</sup> In *Bull. Soc. Bot. de Fr.* viii. 30.

<sup>4</sup> A genus therefore allied to *Amperea*, thence to the *Monatardium*, among the 2-ovulate genera according to us much farther removed from *Euphorbia* to which it has been united by other authors.

<sup>5</sup> 2, 3 species, of which 1 is better known: *C. paucifolium* H. BN. in *Adansonia*, vi. 319.—*C. ephedroides* PL. loc. cit. 31.—BENTH. *Fl. Austral.* vi. 53.—*Euphorbia paucifolia* KL. in *Lehm. Pl. Preiss.* i. 174.—BOISS. *Prodr.* 175; *Euph. Ic.* t. 120.—H. BN. in *Adansonia*, i. 291.

<sup>6</sup> *Fl. Jav. Præfat.* vi.—ENDL. *Gen.* n. 5783.—H. BN. *Euphorb.* 458, t. 4, fig. 14-17.—M. ARG. *Prodr.* 926.—*Cnesmosa* BL. *Bijdr.* 630.

<sup>7</sup> The males very similar to *Tragia*, scarcely distinct by the stamens.

articulate and genuflexo-incurved. Female calyx 3-merous, imbricated. Germen 3-locular; cells oppositipetalous, 1-ovulate; style soon divided into 3 branches very thick simple, 3-agonal dorsally carinate inwardly 2-seriate thickly denticulate, suberect and connivent in much thicker germen mass. Capsule 3-coccous; seeds subglobose lacerate-arillate.—A scandent subtomentose shrub; leaves alternate petiolate, 2-stipulate simple denticulate; flowers racemose; the female 1 or few inferior subsessile; others male longer pedicellate. (*Eastern India, Java*.<sup>1</sup>)

79. **Tragia** PLUM.<sup>2</sup>—Flowers monœcious or rarely diœcious apetalous; male calyx usually 3-partite, more rarely 4-5-partite, valvate. Stamens inserted round 3-agonal rudiment of gynœceum or central (*Agirta*<sup>3</sup>), usually 3, alternating with the sepals or more rarely 1, 2 sometimes, very rarely 6, 2-seriate (*Adenotragia*<sup>4</sup>), 4-8 (*Leucandra*<sup>5</sup>), or 8-15-20 (*Bia*<sup>6</sup>); filaments free or partly 2-nate connate (*Leucandra*), sometimes 1-adelphous at base (*Leptobotrys*,<sup>7</sup> *Lassia*<sup>8</sup>), not incrassate-glandular at base or sometimes incrassate (*Ratiga*<sup>9</sup>); glands of receptacle 0, or equal in number to the stamens and alternating with them, free or more or less connate with base of filaments, some 5-10, subcylindrical or 2-lobed (*Bia*), more rarely all coalescing in short thick cupule. Anthers dorsifixed, usually short; cells subspherical or ovoid, introrsely, laterally or extrorsely rimose, sometimes sessile and horizontally rimose at summit of column dilatated-3-angular (*Lassia*). Female calyx 3-8-partite, imbricate or rarely subvalvate. Germen 3- or rarely 5-locular;<sup>10</sup> cells 1-ovulate; style branches 3 or rarely 5, simple, inwardly stigmatiferous. Fruit capsular, generally furnished with ample urant-setose calyx; cells usually 3; seeds subglobose exarillate.—Herbs undershrubs or shrubs, some-

<sup>1</sup> Spec. 1. *C. javanica* BL. *Bijdr.—Tragia macrophylla* WALL. *Cat.* n. 7793 B.—*T. rugosa* WALL. *Cat.* n. 7794 B.—*T. hastata* REINW. in *Hassk Pl. Rar.* 245.

<sup>2</sup> *Gen.* 14; *Icon.* t. 252.—L. *Gen.* n. 1048.—J. *Gen.* 390 (part.).—LAME. *Ill.* t. 754.—POIR. *Diet.* vii. 722; *Suppl.* v. 328.—ENDL. *Gen.* n. 5782 (part.).—A. JUSS. *Euphorb.* 47 (part.), t. 45, fig. 49 A.—H. BN. *Euphorb.* 459.—M. ARG. *Prodr.* 927.—Schorigeram ADANS. *Fam. des Pl.* ii. 355 (incl.: *Agirta* H. BN. *Bia* KL. *Lassia* H. BN. *Leptobotrys* H. BN. *Leucandra* KL.).

<sup>3</sup> H. BN. *Euphorb.* 463.—M. ARG. *Prodr.* 946, sect. 9.

<sup>4</sup> M. ARG. in *Linnaea*, xxxiv. 179, sect. 3.

<sup>5</sup> KL. in *Erichs. Arch.* (1841), 188.—ENDL. *Gen. Suppl.* ii. 88.—H. BN. *Euphorb.* 477, t. 4, fig. 6-9.—M. ARG. in *Linnaea*, xxxiv. 180; *Prodr.* 929, sect. 4.

<sup>6</sup> KL. *loc. cit.* 189.—ENDL. *loc. cit.* 89.—H. BN. *Euphorb.* 501.—M. ARG. *Prodr.* 928, sect. 2.

<sup>7</sup> H. BN. *Euphorb.* 478, t. 2, fig. 17, 18.—M. ARG. *Prodr.* 946, sect. 10.

<sup>8</sup> H. BN. *Euphorb.* 464, t. 4, fig. 23-28.—M. ARG. *Prodr.* 931, sect. 5 (*Androceum* as in some spec. of *Phyllanthus*).

<sup>9</sup> M. ARG. in *Linnaea*, xxxiv. 181; *Prodr.* 931, sect. 6.

<sup>10</sup> Cells to be observed in calyx beyond 3-partite exterior opposite sepals.

times scandent or voluble, often with hispid urent hairs; leaves alternate, 2-stipulate, petiolate penninerved or digitinerved at base, entire, dentate, incised or sublobate; flowers in terminal or oppositifolious racemes; racemes 2-fid; branches 1-sexual; some male; others female; or oftener 2-sexual; 1 or few inferior flowers female; others male  $\infty$ .<sup>1</sup> (*All warm regions or rarely subtemp.*<sup>2</sup>)

80. **Zuckertia** H. BN.<sup>3</sup>—Flowers monœcious; male bud subpyriform, shortly apiculate; calyx 5-partite, valvate. Stamens  $\infty$  (about 50) central inserted on conical eglandular receptacle; filaments free; cells of extrorse anthers elongate apiculate longitudinally rimose. Female sepals 6–8, 2-seriate imbricate. Germen 3-locular; cells opposite exterior sepals, 1-ovulate; style more or less flexuose, dilated at apex, afterwards divided in revolute simple branches inwardly much papillose. Fruit...? An undershrub (?) voluble, hairs simple (stinging?); leaves alternate long petiolate stipulate widely cordate-ovate, penninerved, sub-3-plinerved at base; flowers in lateral oppositifolious racemes 2-furcate, the branch bearing now male, now female racemes.<sup>4</sup> (*Mexico.*<sup>5</sup>)

81. **Leptorachis** KL.<sup>6</sup>—Flowers, nearly of *Zuckertia*, monœcious; male calyx valvate, 3–5-partite. Stamens  $\infty$ , central; filaments free sometimes dilated above; anthers basifixed elongate, straight or curved, introrsely rimose. Female sepals 5–7, imbricated, sometimes pinnatifid (*Ctenomeria*<sup>7</sup>). Germen, style and fruit as in *Tragia*. Other characters of *Zuckertia*.<sup>8</sup>—Perennial voluble herbs; leaves alternate petiolate stipulate, 3–5-nerved; flowers loosely racemose; inferior in axillary or sometimes oppositifolious racemes

<sup>1</sup> Sect. 9; 1. *Eutyragia* (M. ARG.); 2. *Ratiga* (M. ARG.); 3. *Lassia* (H. BN.); 4. *Tagira* (M. ARG.); 5. *Agirta* (H. BN.); 6. *Leucandra* (KL.); 7. *Bia* (KL.); 8. *Adenotragia* (M. ARG.); 9. *Leptobotrys* (H. BN.).

<sup>2</sup> Spec. 45–50. RHEEDE, *Hort. Malab.* ii. 72, t. 39 (*Schorigeram*).—SW. *Obs.* 353.—JACQ. *Jc. Rar.* t. 190.—H. B. K. *Nov. Gen. et Spec.* ii. 92.—VELLOS. *Fl. Flum.* x. t. 6.—MICHX. *Fl. Bor.-Am.* ii. 176.—PEPP. et ENDL. *Nov. Gen. et Spec.* iii. 20, t. 223.—BL. *Bijdr.* 630.—BENTH. *Niger*, 501.—SOND. in *Linnaea*, xxiii. 107.—GRISEB. in *Nachr. d. Ges. Wiss. Göttingen* (1865), 176; *Fl. Brit. W.-Ind.* 48.—M. ARG., in *Flora* (1864), 436, 538; in *Seem. Journ.* i. 333.—H. BN. in *Adansonia*, 75, 275, 276 (*Lassia*); iii.

162; v. 305; vi. 320.

<sup>3</sup> *Euphorb.* 495, t. 4, fig. 10–13.

<sup>4</sup> Somewhat allied to gen. *Tragia*, sect. *Bia*, to be distinguished from it on the same ground as from *Leptorachis*.

<sup>5</sup> Spec. 1. *Z. cordata*, H. BN. loc. cit.—*Tragia Bailloniana* M. ARG. in *Linnaea*, xxxiv. 178; *Prodr.* 927. In habit similar to American *Plukenetia*.

<sup>6</sup> In *Ericks. Arch.* (1841), 189.—ENDL. *Gen. Suppl.* ii. 89.—H. BN. *Euphorb.* 495.—M. ARG. *Prodr.* 925.

<sup>7</sup> HARV. in *Hook. Journ.* (1842), 29.—ENDL. *Gen. Suppl.* iii. 98.—H. BN. *Euphorb.* 494.

<sup>8</sup> Between this genus and *Tragia*.

(*Ctenomeria*) 1, or more rarely few (sometimes 0) female; the rest male  $\infty$ . (*South Brazil*,<sup>1</sup> *South Africa*.<sup>2</sup>)

82. **Bocquillona** H. BN.<sup>3</sup>—Flowers dioecious apetalous<sup>\*</sup>; male calyx 2-3-partite. Stamens 2, 3, central; filaments central or inserted on glandular receptacle, below small rudiment of short gynæceum, connate at base; anthers extrorse, 2-rimose. Female calyx 4-5-fid or partite; præfloration . . . ? Germen 3-locular; cells 1-ovulate; style branches 3, sessile or subsessile, carnose-subpetaloid, 3-angular-obovate, more or less crenate plicate papillose within, sometimes subcarinate. Capsule 3-coccous, often villosulose; seeds slightly or not arillate at micropyle.—Trees or shrubs; branches often thick; leaves alternate simple, sometimes penninerved, entire sinuate or dentate; petiole usually short-2-stipulate; male flowers small crowded densely glomerulate in wood of branches; female subracemose or oftener subcapitate, cymose in wood of branches, often shortly pedunculate.<sup>4</sup> (*N. Caledonia*.<sup>5</sup>)

83 ? **Cladogynos** ZIPP.<sup>6</sup>—“Flowers monœcious;<sup>7</sup> male calyx coloured, 2-3-partite, valvate. Stamens 4, central; filaments connate at base; anthers introrsely rimose. Female calyx large foliaceous, 6-fid. Germen 3-locular; cells 1-ovulate; style 3-fid glandular-plumose ramified. Capsule 3-coccous; seeds solitary in cells carunculate.—An erect simply ramified whitish-tomentose shrub; leaves petiolate subpeltate repando-dentate sub-3-lobed, reticulate tomentose below; male flowers capitate-congested; female long pedicellate.<sup>8</sup>” (*Timor, Celebes*.<sup>9</sup>)

84. **Cephalocroton** HOCHST.<sup>10</sup>—Flowers monœcious apetalous; male calyx valvate, 3-4-partite. Stamens 4, alternating with sepals

<sup>1</sup> Spec. 1. *L. hastata* KL. loc. cit.

<sup>2</sup> Spec. 1. *L. capensis* M. ARG. Prodr. 926.—*Tragia capensis* THUNB. Prodr. Fl. Cap. 14.—*Ctenomeria cordata* HARY. loc. cit.—H. BN. in *Adansonia*, iii. 161.—*C. Kraussiana* HOCHST. in *Flora* (1845), 85.—SOND. in *Linnaea*, xxiii. 110.

<sup>3</sup> In *Adansonia*, ii. 225.—M. ARG. Prodr. 894.

<sup>4</sup> A genus remarkable from its peculiar habit.

<sup>5</sup> Species yet known 6. M. ARG. in *Linnaea*, xxxiv. 166.—H. BN. op. cit. ii. 226; xi. 127.

<sup>6</sup> Ex SPAN. in *Linnaea*, xv. 349.—ENDL. Gen. Suppl. ii. 89.—H. BN. *Euphorb.* 468.—M.

ARG. Prodr. 895.

<sup>7</sup> “Androgyni,” as they say.

<sup>8</sup> A genus quite unknown to us, and of dubious affinity; whether a species of *Cephalocroton* sect. *Chloradenia*, or the same as *Calpignyia* BL. (p. 152, not 1, 4<sup>e</sup>) ?

<sup>9</sup> Spec. 1. *C. orientalis* ZIPP. loc. cit.—*Conceveibum tomentosum* SPAN. loc. cit. (nec. SPRENG.).

<sup>10</sup> In *Flora* (1841), 370.—ENDL. Gen. n. 5796<sup>1</sup>.—H. BN. *Euphorb.* 474, t. 18, fig. 24-27; in *Adansonia*, v. 147.—M. ARG. in *Linnaea*, xxxiv. 155; in *Mém. Soc. Phys. Gen.* xvii. 460, fig. D, 1-4; *Prodr.* 760.

or 6-8; the 2-4 interior, alternating with the exterior; filaments free inserted round rudiment of gynæceum, entire or rarely 2-3-fid (*Eucephalocroton*<sup>1</sup>) genuflexo-plicate-produced in bud, finally erect and exserted; anthers in bud and after unfolding always introrse, longitudinally rimose. Female calyx 4-6-fid or partite, imbricated. Germen 3-locular; glands of hypogynous disk same in number, alternating with calyx lobes coloured (*Chloradenia*<sup>2</sup>) or 0 (*Eucephalocroton*, *Adenochlæna*<sup>3</sup>); cells 1-ovulate; style branches irregularly 2 or 2-3-chotomous ramified; twigs papillose-stigmatiferous. Capsule 3-coccous; seeds subglobose exarillate.—Small trees or shrubs; indumentum usually stellate; leaves alternate or subopposite petiolate stipulate reticulated; male flowers terminal glomerate-capitate; the female below or at remote axils few solitary or pedunculate. (*Trop. Asia, Ind. Arch., Eastern Cont. and Ins. Africa*.<sup>4</sup>)

85 ? **Cœlodepas** HASSK.<sup>5</sup>—“Flowers monœcious apetalous; male calyx 3, 4-fid valvate; the female 4-10-partite. Stamens 5-6; exterior alternating with the sepals; filaments thick inserted round rudiment of gynæceum; anther cells pendulous, free below, introrsely rimose. Germen 3-locular; cells 1-ovulate; posterior 2; style branches 3, wide, 2-lobed; lobes inciso-pluridentate palmate expanded. Capsule 3-coccous; seeds exarillate; embryo (coloured) albuminous.”—A Javanese tree; leaves alternate stipulate simple largely serrate, 2-glandular at base; flower in slender spikes, sometimes ramified at base; the inferior 1, 2, female; peduncles stellate-tomentose; male bracts  $\infty$ -florous.<sup>6</sup> (*Java*.<sup>7</sup>)

86. **Symphyllia** H. BN.<sup>8</sup>—Flowers monœcious (nearly of *Cephalocroton*); male calyx valvate, 3-6-partite. Stamens same in number (of *Cephalocroton*) alternating with the sepals, inserted below rudiment of gynæceum; anthers 2-locular; cells introrsely rimose longitudinally adnate, basifixed imbedded, below to a considerable extent free, always erect, emarginate on both sides.

<sup>1</sup> M. ARG. *Prodr.* 761, sect. 2.

<sup>2</sup> H. BN. *Euphorb.* 471, t. 19, fig. 24, 25.—M. ARG. *Prodr.* 760, sect. 1.—*Adenogynum* REICHB. F. et ZOLL. *Op. Scort. v. Rottl.* 20; in *Linnaea*, xxviii. 325.

<sup>3</sup> BvN. MSS. ex H. BN. *Euphorb.* 472.—M. ARG. *Prodr.* 762, sect. 3.—*Centrostylis* H. BN. *Euphorb.* 469, t. 2, fig. 28, 29.

<sup>4</sup> Spec. ad 6. HASSK. *Hort. Bog.* ed. nov. 28 (*Adenogynum*).—KL. in *Pet. Mossamb. Bot.* 99. THW. *Enum. Pl. Zeyl.* 270 (*Adenochlæna*).—H.

BN. in *Adanson*, i. 276.

<sup>5</sup> In *Flora* (1857), 531; in *Retzia*, 44; in *Bull. Soc. Bot. de Fr.* vi. 713.—M. ARG. *Prodr.* 759.—*Koelodepas* HASSK. in *Bot. Zeit.* (1856) 802.

<sup>6</sup> A genus whose flowers are unknown to us, but from description it might be better reduced to a section of *Cephalocroton*, differing by partly free anther cells.

<sup>7</sup> Spec. 1. *C. bantamense* HASSK. *loc. cit.*

<sup>8</sup> *Euphorb.* 473, t. 11, fig. 6, 7.—M. ARG. *Prodr.* 763.



Female calyx 5-6-partite, imbricated. Germen 2-3-locular; style branches divaricate-patent, inwardly densely papillose-fimbriate. Capsule rather fleshy, 1-spermous by abortion, mature?—Shrubs sub-2-chotomous ramified; leaves alternate or collected at summit of twigs, falsely verticillate-stipulate, often subsessile, entire or denticulate penninerved; flowers in terminal ramified spikes, usually glomeruliferous; female in each inferior or in the axils of upper leaves few.<sup>1</sup> (*East India*.<sup>2</sup>)

87. **Sphærostylis** H. BN.<sup>3</sup>—Flowers monœcious; male calyx valvate, 3-partite; sepals at base inwardly horizontally finally (in false annular disk) plicate-prominent. Stamens 3, alternating with sepals; filaments central, 1-adelphous; anthers inserted at summit of column, introrse finally subhorizontally-reflexed, longitudinally rimose. Female calyx 5-6-partite, valvate or slightly imbricated. Germen 3-locular; cells opposite exterior sepals 1-ovulate. Style many times larger than germen globose, fleshy, 3-sulcate at apex; furrows alternating with cells radiant from centre and stigmatiferous. Capsule 3-coccous; seeds smooth.—A scandent shrub; leaves alternate ovate 3-plinerved petiolate; stipules articulate; flowers in spicate axillary or terminal racemes; male bracts superior  $\infty$ , 1-florous; inferior few female. (*Madagascar*.<sup>4</sup>)

88. **Astrococcus** BENTH.<sup>5</sup>—Flowers monœcious; male calyx valvate, 4-partite. Stamens 4-8, central inserted in concave receptacle or round rudiment of gynœceum; filaments free or 1-adelphous at base; anthers introrse emarginate; cells all longitudinally adnate, longitudinally rimose. Disk round urceolate androceum, thick 4-agonal, 4-lobed, or 0 (*Hæmatostemon*.<sup>6</sup>) Female calyx 4-7-partite, imbricated. Germen 3-locular; cells 1-ovulate; style thick obovoid, concave and outwardly unequally 6-sulcate stigmatiferous at apex; Capsule horizontally saccate 1-3-coccous, narrow and subpyramidal at apex; cocci and back thickly cornute 2-cristate. Seed descendent, more or less oblique, albuminous.—Trees; leaves alternate; shortly

<sup>1</sup> A genus allied to *Cephalocroton*, differing by constitution of anthers, fruit, habit and inflorescence.

<sup>2</sup> Spec. 2. WALL. exs. n. 9095 (*Clusia*).—M. ARG. in *Linnaea*, xxxiv. 156.

<sup>3</sup> *Euphorb.* 466, t. 21, fig. 19-21.—M. ARG. *Prodr.* 768.

<sup>4</sup> Spec. 1. *S. Tulasneana* H. BN. *loc. cit.* 467; in *Adansonia*, i. 276.

<sup>5</sup> In *Hook. Journ.* (1854), 327.—H. BN. *Euphorb.* 476, t. 22, fig. 22-24.—M. ARG. *Prodr.* 766.

<sup>6</sup> M. ARG. in *Linnaea*, xxxiv. 157; *Prodr.* 767, sect. 2.

petiolate, penninerved denticulate; flowers in axillary and terminal racemes, 2-sexual. (*North Brazil*.<sup>1</sup>)

89. **Angostyles** BENTH.<sup>2</sup>—Flowers monœcious apetalous; male calyx valvate, 3-4-partite. Stamens  $\infty$  (about 20), inserted on elevated receptacle; filaments central short, 1-adelphous at base; anthers 2-dymous; connective wide 3-angular; cells free among themselves, widely adnate to connective, divergent at base. Female calyx 5-partite, quincuncially imbricated. Germen 3-locular; cells 1-ovulate; style (much larger than germen) thick obconical; branches 3, deeply 2-partite; lobes hence 6 inwardly wide papillose-carinate.<sup>3</sup> Fruit capsular, 3-cocceous; seed . . . ?—A tree; leaves alternate, collected at summit of twigs, 2-stipulate, penninerved denticulate; below at base marked on both sides with 4-8 glands. Flowers cymose-racemose on wood of branches of preceding year; the female solitary in axils of leaves of branches of the present year. (*North Brazil*.<sup>4</sup>)

90. **Fragariopsis** A. S. H.<sup>5</sup>—Flowers monœcious; male calyx valvate, 4-5-partite. Stamens  $\infty$ , alternately seriate, sometimes few remote; anthers extrorse subsessile in hemispherical glandular receptacle; cells divergent deflexed at base, longitudinally rimose. Female calyx 4-partite. Germen sessile; cells 4, alternating with sepals, 1-ovulate; style (much larger than germen) thickly obovoid, obpyramidal or subcuboid, shortly 4-lobate at apex; cells cruciate radiant, inwardly sulcate and stigmatiferous. Fruit globose or subcuboid, carnosc-suberous, 1-4-locular; seed . . . ?—Scandent shrubs; leaves alternate stipulate penninerved; base of limb 2-glanduliferous above, glandular-denticulate at margin; flowers in oppositifolious or extra-axillary racemes; the inferior in the racemes female; the others male. (*Brazil*.<sup>6</sup>)

91. **Plukenetia** PLUM.<sup>7</sup>—Flowers monœcious apetalous (nearly of

<sup>1</sup> Spec. 2. *M. ARG. loc. cit.*—H. BN. in *Adansonia*, v. 307.

<sup>2</sup> In *Hook. Journ.* (1854), 328.—H. BN. *Euphorb.* 498, t. 9, fig. 8-11.—*M. ARG. Prodr.* 767.

<sup>3</sup> The style hence representing all the corolla, thick tubular-infundibuliform 6-lobed above.

<sup>4</sup> Spec. 1. *A. longifolia* BENTH. *loc. cit.*—H. BN. in *Adansonia*, v. 318.

<sup>5</sup> A. S. H. *Morphol. Veg.* 426 (ex H. BN. *Euphorb.* 497, t. 12, fig. 45; t. 13, fig. 29-36).—*M. ARG. Prodr.* 773.—*Accia*, A. S. H. *op. cit.* 499.—*Botryanthe* KL. in *Erichs. Arch.* (1841), 190, t. 9, fig. B.—ENDL. *Gen. n.* 5784<sup>1</sup>.

<sup>6</sup> Spec. 1, 2. H. BN. in *Adansonia*, v. 317.

<sup>7</sup> *Nov. Gen. Amer.* 47, t. 13; *lc.* t. 226.—*L. Gen. n.* 1080.—*J. Gen.* 392.—*LAMK. Ill. t.* 788.—*POIR. Diet.* vi. 449; *Suppl.* v. 20.—ENDL.

*Fragariopsis*); male calyx-valvate, 4-5-partite. Stamens  $\infty$ , inserted on more or less convex receptacle, either central or inserted round rudiment of gynæceum; filaments confluent at base; anthers extrorse, 4-lobed; cells 2, adnate at apex, diverged at base, often deflexed, longitudinally rimose. Female calyx 4-6-partite, imbricated. Disk urceolar, adhering to calyx, small or 0. Germen 3-4-locular; cells 1-ovulate, sometimes carinate or thickly subulate at back; style varied in form, thickly cylindrical or obovoid, or obpyramidal, sometimes sublobose, stigmatiferous, subentire or shortly lobed at apex; furrows 3, 4, radians tumido-marginate. Fruit capsular; mesocarp more or less thick or rather fleshy, solute from cells of endocarp finally 2-valved ligneous; seeds exarillate albuminous.—Shrubs usually scandent;<sup>1</sup> leaves alternate petiolate stipulate penninerved or 3-5-nerved; limb furnished with at base 2 glands and same number of stipels; flowers in 2-sexual axillary racemes; female inferior 1- $\infty$ ; others male.<sup>2</sup> (*All warm regions.*<sup>3</sup>)

92. **Dalechampia** PLUM.<sup>4</sup>—Flowers monœcious apetalous; male calyx valvate, 4-5-partite. Stamens subdefinite (5-10) or oftener  $\infty$ ; filaments in central column cylindrical or subclavate, long 1-adelphous, finally free; anther 2-locular; cells longitudinally adnate, extrorsely rimose. Female calyx 5-15-partite; leaves imbricated or valvate, entire or pinnatifid. Germen<sup>5</sup> 3-4-locular; cells 1-ovulate; style cylindrical or clavate at apex, or laterally more or less hollow below apex inwardly stigmatiferous, entire or 3-6-lobed; lobes small equal or unequal, opposite cells alternating with them. Fruit capsular 3-4-coccous elastically dehiscent; seeds globose or ellipsoidal

*Gen.* n. 5784.—A. JUSS. *Euphorb.* 47.—H. BN. *Euphorb.* 483.—M. ARG. *Prodr.* 768.—*Anabæna* A. JUSS. *Euphorb.* 46, t. 15, fig. 48.—ENDL. *Gen.* n. 5785.—*Sajorium*, ENDL. *Gen. Suppl.* iii. 98.—H. BN. *Euphorb.* 480, t. 21, fig. 3, 4.—*Hedraistylus* HASSK. *Hort. Bog.* 34.—*Pterococcus* HASSK. in *Flora* (1842), Beibl. ii. 41 (nec PALL.).

<sup>1</sup> Some parts, especially the flower and fruit, imbued with a purple or subviolet juice.

<sup>2</sup> Sect. 5: 1. *Euplukenetia* (M. ARG.); 2. *Cylindrophora* (M. ARG.); 3. *Anabæna* (A. JUSS); 4. *Angostyliidium* (M. ARG.); 5. *Hedraistylus* (HASSK.).

<sup>3</sup> Spec. about 10. RUMPH. *Herb. Amboin.* i. 193, t. 79 (*Sajor*).—L. *Spec.* 1192.—W. *Spec.* iv. 514.—SM. in *Nov. Act. Upsal.* vi. 4.—SOND. in

*Linnaea*, xxiii. 110.—M. ARG. in *Linnaea*, xxxiv. 157; in *Flora* (1864), 530. GRISER. *Fl. Brit. W.-Ind.* 46.—H. BN. in *Adansonia*, iii. 160 (*Sajorium*); v. 309.

<sup>4</sup> *Nov. Gen. Amer.* 17, t. 38.—L. *Gen.* n. 1081.—ADANS. *Fam. des Pl.* ii. 357.—J. *Gen.* 392.—LAMK. *Diet.* ii. 256; *Suppl.* ii. 447; *Ill.* t. 788.—A. JUSS. *Euphorb.* 55, t. 17, fig. 59.—H. BN. *Euphorb.* 58, 485, t. 3, fig. 16-33.—M. ARG. *Prodr.* 1232.—BAKER, *Fl. Mawit.* 316.—*Cremophyllum* SCHWEIDL. in *Flora* (1843), 514; in *Bot. Zeit.* (1849), 141.—*Rhopalostylis* KL. MSS. (ex H. BN. in *Adansonia*, v. 317).

<sup>5</sup> In species sect. 1, surrounded with cupuliform disk. *Champadelia* (H. BN. *Euphorb.* 485, t. 3, fig. 31, 32).

sometimes truncate, exarillate, smooth or unequally-rugose or tuberculate; cotyledons of albuminous embryo ovate.—Fruit sometimes decumbent, oftener scandent or voluble; leaves alternate stipulate penninerved or digitinerved, entire, dentate or lobed, sometimes compound; leaves often petiolate; inflorescence 2-sexual axillary pedunculate; bracts 2, usually large foliaceous, sometimes coloured,<sup>1</sup> stipulate;<sup>2</sup> female flowers laterally inferior, few (generally 3) cymose; male superior in terminal contracted cymes; female cymes surrounded by a special pluribractiate involucre; male above accompanied laterally by fleshy reddish multicristate appendage (sterile bractlets?<sup>3</sup>); pedicels short articulate.<sup>4</sup> (*All hot regions.*<sup>5</sup>)

93. **Pera** MUT.<sup>6</sup>—Flowers diœcious apetalous; male calyx 2-5-partite or -fid, valvate, sometimes small or rudimentary. Stamens 2-10 often equal in number to sepals; filaments central, shortly or sometimes long (*Schismatopera*<sup>7</sup>) connate in column; anthers introrsely laterally or extrorsely 2-rimose. Calyx of female flowers short or evolute; sepals subfree or more or less high connate. Germen central, 3-locular; ovules solitary in cells; micropyle extrorse superior obturated; style short thick, afterwards divided in large entire or more or less deep crenate. Capsules 3-coceous; cocci 2-valved; endocarp usually solute; micropyle of very albuminous seeds with incrassate fleshy aril.—Trees,<sup>8</sup> glabrous sprinkled with fasciculate or lepidote hairs; leaves alternate or rarely opposite, entire penninerved subcoriaceous exstipulate; flowers axillary pedicellate subsolitary or few cymose included in involucre, involucre

<sup>1</sup> Whitish, yellowish, or rather purpurascant.

<sup>2</sup> Small, often whitish.

<sup>3</sup> Anthers deformate? (ARG.).

<sup>4</sup> A genus constituting a peculiar sect. (*Delechampieæ* M. ARG.), formerly part of *Euphorbiæ* (A. Juss.). We think it allied to *Plukenetia*, differing from it by its abbreviate contracted anthers.

<sup>5</sup> Spec. ad 50. H. B. K. *Nov. Gen. et Spec.* ii. 98.—ENDL. *Atakt.* t. 20, 21.—BL. *Bijdr.* 632.—WIGHT, *Icon.* t. 1882.—PEP. et ENDL. *Nov. Gen. et Spec.* iii. 19, t. 222.—GRISEB. in *Nachr. d. Wiss. Gœtt* (1865), 181; *Fl. Brit. W.-Ind.* 51.—BENTH. *Niger*, 500.—M. ARG. in *Linnaea*, xxxiv. 219; in *Flora* (1872), 45.—H. BN. in *Adan-*

*sonia*, i. 75, 277, 350; iii. 161; v. 309; vi. 16.

<sup>6</sup> In *Abh. der Schwed. Akad.* v. (1784), 299, t. 18.—KL. in *Erichs. Arch.* (1841), vii. 179.—ENDL. *Gen.* n. 5768 (Suppl. ii. 87).—H. BN. *Euphorb.* 433, t. 2, fig. 25-27.—M. ARG. *Prodr.* 1025.—PERULA, SCHREB. *Gen.* 703.—*Spizia*, LEANDR. in *Munch. Denkschr.* vii. 231, t. 13.—*Peridium* SCHOTT. in *Spreng. Cur. Post. App.* 410.—KL. *loc. cit.* 180, t. 7; in *Hook. Journ.* (1843), 44.—*Clistranthus* POIT. MSS. (ex H. BN. *loc. cit.*).

<sup>7</sup> KL. *loc. cit.* t. 7.

<sup>8</sup> Habit in some respects that of *Monimia-cææ*, *Avonaceæ* or *Ardisiaceæ*.

bud-shaped or sacciform, 1-2-brokenly-rimose, 1-2-valved, surrounded at the base with 1 or few unequal bractlets;<sup>1</sup> male flowers surrounded within the involucre by a few rudiments (various in form) of female flowers.<sup>2</sup> (*Warm America*.<sup>3</sup>)

#### IV. CROTONEÆ.

94. **Croton** L.—Flowers monœcious or more rarely diœcious, 4-6, generally 5-merous; male sepals valvate or more or less imbricate. Petals imbricate or oftener finally sub-valvate, sometimes not touching. Glands of disk free alternipetalous. Stamens either sub-definite or definite, sometimes 10, 2-seriate or 5-8, oftener 15-∞, ∞-seriate; filaments free inserted in convex often villose receptacle, infraeto-incurved in the bud; anthers introrse (on account of the incurvation of the filaments extrorse in the bud), finally oscillating-erect. Germen rudimentary, sometimes 0. Glands of hypogynous disk free or connate, often thick. Germen 3- or more rarely 2- or 4-locular; ovule in cell 1, descendent; micropyle extrorse superior, obtected by obturator; style from base or more or less high 3-lobed or partite; branches simple 2- or 3-∞-fid incurved or involute stigmatiferous at apex. Capsule usually 3-cocceous, sometimes with difficulty or late dehiscing; cocci 2-valved; seeds arillate at micropyle; cotyledons of albuminous embryo foliaceous, much wider than radicle.—Trees, shrubs or undershrubs, or more rarely herbs; indumentum usually stellate or lepidote; leaves alternate or sub-verticillate, entire or variously incised or lobed, penninerved or digitinerved at base; stipules lateral, entire or more or less divided, sometimes glanduliform; inflorescence terminal; flowers in racemes or spikes, simple or more or less ramified; female in 2-sexual inflorescence inferior 1 or few, sometimes ∞; others male superior solitary, in axils of bracts or few ∞, cymose or glomerate. (*All hot regions*.) See p. 129.

<sup>1</sup> Often corresponding to clefts of involucre.

<sup>2</sup> A genus remarkable for its enormous bud-like inflorescence, formerly constituting a family or section of *Prosopidoceinea*, (KL.). Now 5 sect.: 1. *Eupera* (H. BN.); 2. *Neopera* (GRISEB.); 3. *Spixia* (LEANDR.); 4. *Peridium* (SCHOTT), 5. *Schismatopera* (KL.).

<sup>3</sup> Spec. 16, 17. SCHRANK in *Observ. Acad. Münch.* vii. 242 (*Spixia*).—? H. B. K., *Nov. Gen. et. Spec.* vii. 191 (*Myristica*).—MART, *Herb. Fl. Bras.* 270 (*Spixia*).—BENTH. in *Hook. Journ.* (1854), 322 (*Peridium*).—GRISEB. in *Nachr. d. Wiss. Gatt.* (1865), 180; *Fl. Brit. W.-Ind.* 51.—H. BN. in *Adansonia*, v. 222.

95. **Julocroton** MART.<sup>1</sup>—Flowers monœcious (nearly of *Croton*) resupinate; sepals valvate or slightly imbricate; anterior 1, others larger; posterior 2 smaller. Other characters of *Croton*.—Shrubs, undershrubs or herbs; habit, leaves, indumentum (copious) and inflorescence of *Croton*. (*Trop. America, N. and S.*<sup>2</sup>)

96? **Crotonopsis** MICHX.<sup>3</sup>—Flowers monœcious (nearly of *Croton*); calyx imbricated. Male petals 5, sometimes very small or 0. Stamens usually 5 (of *Croton*), oppositipetalous, inserted round small rudiment of gynæceum. Female calyx regular or irregular. Petals 0, or very minute. Germen 1-locular, 1-ovulate; style twice or more times 2-chotomous. Fruit dry membranous, indehiscent; seed 1, scantily or scarcely arillate.—Thin-stemmed herbs sprinkled with glandular peltate hairs.<sup>4</sup> Leaves alternate petiolate narrow; flowers in 2-sexual spikes; bracts 1-florous; inferior female; others male. Other characters of *Croton*. (*Warm N. America.*<sup>5</sup>)

97? **Eremocarpus** BENTH.<sup>6</sup>—Flowers monœcious (nearly of *Croton*) apetalous; stamens 5–7 (of *Croton*). Female calyx 0. Germen 1-locular, 1-ovulate; style simple slender, subulate stigmatiferous at apex. Fruit capsular, 2-valved, 1-spermous. Other characters of *Croton*.—Annual graveolens herbs sprinkled everywhere with stellate hairs or rigid hyaline bristles; branches 2, 3-chotomous patulous; leaves opposite or falsely verticillate petiolate rhomboid, 3-plinerved; flowers in short glomeruliform spikes at nodes; female inferior or intermixed few. (*California.*<sup>7</sup>)

<sup>1</sup> *Herb. Fl. Bras.* 119.—KL. in *Erichs. Arch.* (1841), i. 193.—ENDL. *Gen. n.* 5828.—H. BN. *Euphorb.* 374.—M. ARG. *Prodr.* 700.—*Hetero-chlamys* TURCZ. in *Bull. Mosc.* (1843), 61; in *Flora* (1844), 121.—ENDL. *Gen. Suppl. v.* 91.—*Centandra* KARST. *Fl. Columb.* 177, t. 88.

<sup>2</sup> Spec. ad 15. LAMK. *Diet.* ii. 214 (*Croton*).—SPRENG. *Syst.* ii. 374 (*Croton*).—VELLOS. *Fl. Flum.* x. t. 65, 66 (*Croton*).—SCHLECHTL. in *Linnaea*, vii. 380 (*Croton*); xix. 245.—KL. *Pl. Meyen.* in *Nov. Act. Nat. Cur.* xix. Suppl. 1, 417.—H. BN. in *Adansonia*, iv. 367.

<sup>3</sup> *Fl. Bor.-Amer.* ii. 185, t. 46.—A. JUSS. *Euphorb.* 31, t. 8, fig. 27.—ENDL. *Gen. n.* 5826.

—H. BN. *Euphorb.* 380, t. 12, fig. 23–27.—M. ARG. *Prodr.* 707.—*Friesia* SPRENG. *Syst.* 760.—*Leptemon* RAFIN. in *N.-York. Med. Repos.* ii. v. 350 (ex ENDL.)

<sup>4</sup> Whence silvery-lepidote.

<sup>5</sup> Spec. 1, 2. W. Spec. iv. 380.—PURSH. *Fl. Amer. Sept.* i. 206.—A. GRAY, *Man.* 392.—BECK, *Bot. N. and M. Stat.* 310.

<sup>6</sup> *Veg. Sulph. Bot.* 53, t. 26.—ENDL. *Gen. n.* 5862<sup>a</sup>.—H. BN. *Euphorb.* 381.—M. ARG. *Prodr.* 708.

<sup>7</sup> Spec. 1. *E. setigerus* BENTH. *loc. cit.*—LINDL. *Veg. Kingd.* 276, fig. 191.—*Croton setigerus* Hook. *Fl. Bor.-Amer.* ii. 141.

## V. EXCÆCARIÆ.

98. **Excæcaria** L.—Flowers monœcious or more rarely dioecious, apetalous, often 2–3-merous. Sepals 2, 3 of male calyx (of which 1 is posterior), very rarely 4, free or more or less high connate, imbricate, sometimes small or very minute, incised or glanduliform, or more rarely rudimentary or 0. Stamens usually 2, 3, alternating with a like number of sepals, more rarely 1, or 4–15; filaments central free or oftener more or less high connate in central cylindrical column, very rarely conical; anthers extrorse, short; cells long adnate, dehiscent by longitudinal clefts, sometimes short poriform. Calyx of female flower as in male. Germen sessile or very short stipitate; cells usually 2, 3, alternating with sepals, ovule in cells solitary descendent; micropyle extrorse superior, usually obtected with short small obturator; style more or less high, ramified sometimes nearly to base; branches terete or more rarely laminiiform-compressed, stigmatiferous within, patulous or oftener recurved or revolute. Fruit capsular, usually 2–3-cocceous; columella more or less elongate, sometimes obsolete, base often horizontally dilated in 3-angular-cornute carpophore. Seeds at micropyle variously or not arillate-incrassate; chalaza basilar or sometimes more or less ventral; albumen copious oily; radicle of straight, vertical, more rarely oblique or sub-horizontal embryo much narrower than foliaceous cotyledons.—Trees, shrubs or more rarely under-shrubs or herbs; juice often milky; leaves alternate, rarely opposite or sub-verticillate simple; limb often glandular-dentate or furnished with basilar variously formed glands; stipules membranous entire, lacerate, or glanduliform, more rarely 0; flowers spicate or racemose, terminal or more rarely axillary or lateral; female sessile or pedicellate, the inferior in inflorescence androgynous; others male, either 1-bracteate or glomerate or cymose in each bract; bracts and bractlets usually, like the leaves, 2-glanduliferous at base. (*All trop. and sub-trop. regions.*). See p. 133.

99. **Senefeldera** MART.<sup>1</sup>—Flowers monœcious (nearly of *Excæcaria*); male calyx obovoid, shortly 3-lobed, imbricated. Stamens 6–8, or fewer by abortion, inserted in conical thick receptacle, free 2-seriate; anthers extrorse, 2-rimose. Female flowers (of *Excæcaria*)

<sup>1</sup> In *Flora* (1841), ii, Beibl. 29.—KL. in *Erichs. feldera* ENDL. *Gen. Suppl.* ii. 88.—H. BN. *Arch.* vii. 184.—M. ARG. *Prodr.* 1153.—*Senne- Euphorb.* 535, t. 9, fig. 39, 31.

3-merous. Capsule 3-cocceous; seeds arillate at micropyle; chalaza placed at middle of internal angle.—A glabrous tree; leaves alternate petiolate stipulate penninerved veined, glanduliferous below; flowers in much ramified terminal racemes; bracts crowded, 2-glandular, 1-3-flowered; the inferior on each branch small, female; others male.<sup>1</sup> (*Brazil*.<sup>2</sup>)

100. **Pachystroma** KL.<sup>3</sup>—Flowers monœcious (nearly of *Excæcaria*), 3-merous; male calyx valvate or sub-valvate. Stamens 8, alternating with sepals, 1-adelphous; filaments erect; anthers basifixed erect; extrorsely rimose. Sepals of female flowers strictly involute-imbricate. Gynæceum of *Excæcaria*; germen strictly enclosed in calyx. Capsule 3-cocceous; cocci 1-spermous; receptacle in short columella 3-cornuate incrassate at base; seeds exarillate.—A glabrous tree; juice milky; leaves alternate coriaceous repando-spinose (holly-like), shortly petiolate; stipules wide at base, thence marked from annular cicatrices of branches; flowers (greenish-lutescent) terminal spicate; female 1 or few inferior; others male; bracts (of *Excæcaria*) large glanduliferous.<sup>4</sup> (*Brazil*.<sup>5</sup>)

101. **Hippomane** L.<sup>6</sup>—Flowers monœcious (nearly of *Excæcaria*), 2-3-merous; calyx imbricated. Stamens 2, central (of *Excæcaria*). Germen 5-10-locular; style branches same in number. Fruit pomiform drupaceous; mesocarp fleshy; putamen osseous unequally-rugose; cells 5-10, 1-spermous. Seeds descendent<sup>7</sup> exarillate (of *Excæcaria*).—A tree; juice milky; leaves<sup>8</sup> alternate (of *Excæcaria*) long petiolate stipulate; limb denticulate, 1-2-glandular at base;

<sup>1</sup> A genus scarcely distinct from *Excæcaria*, differs by conical receptacle, number of stamens, situation of chalaza (char. by themselves not absolute), and constitution of inflorescence and branching.

<sup>2</sup> Spec. 1? *S. multiflora* MART. loc. cit.—H. BN. in *Adansonia*, v. 336; xi. 125.—*S. angustifolia* KL. loc. cit.—*S. latifolia* KL.—? *S. grandifolia* KL. loc. cit.

<sup>3</sup> KL. ex H. BN. in *Adansonia*, 1, 212; xi. 102.—M. ARG. in *Linnaea*, xxxiv. 177; *Prodr.* 893.—*Acantholoma* GAUDICH. ex H. BN. in *Adansonia*, vi. 231, t. 1.

<sup>4</sup> A genus differing by male valvate calyx from *Excæcaria* (of which it might be a section?), according to ARG. placed with *Acalypha*.

<sup>5</sup> Spec. 1. *P. ilicifolium* KL. loc. cit.—*Acantholoma spinosum* GAUDICH. loc. cit.—? *Excæcaria ilicifolia* SPRENG. *N. Eudr.* ii. 117.

<sup>6</sup> Gen. n. 1088.—J. Gen. 391.—LAMK. *Ill.* t. 793.—DESROUX. *Diet.* iii. 694.—NECK. *Elem.* ii. 344.—TURN. in *Diet. Sc. Nat.* Atl. t. 278.—A. JUSS. *Euphorb.* 51, t. 16, fig. 54.—SPACH, *Suit. à Buffon*, ii. 524.—ENDL. *Gen.* n. 5777.—H. BN. *Euphorb.* 539, t. 6, fig. 12-20.—M. ARG. *Prodr.* 1199.—*Mancinella* PLUM. *Gen.* 49, t. 30.—*Mancinella* Tuss. *Fl. Ant.* iii. 21, t. 5.

<sup>7</sup> Funicle slender obliquely descending in woody channel of coccus; micropyle shortly conical without, very distinct and rather superior to ventral hilum.

<sup>8</sup> Generally much recalling *Piri communis*.



inflorescence terminal (of *Exceccaria*); bracts 2-glandular; the inferior surrounding 1 female flower; the superior the  $\infty$  male<sup>1</sup> cymose flowers.<sup>2</sup> (*Equinoctial America Cont. and Ins.*<sup>3</sup>)

102. **Carumbium** REINW.<sup>4</sup>—Flowers monœcious apetalous; male calyx ventrally and dorsally compressed with receptacle; leaves 2, equal or unequal, imbricated; other sometimes rudimentary or unequally-gibbous, glandular dilated at base. Stamens  $\infty$  (4–40), in 2- or more series, sub-central (*Homalanthus*<sup>5</sup>) or shortly inserted round vacant centre (*Stomatocalyx*<sup>6</sup>), surrounded outside by a receptacle scarcely or more or less incrassate in disk; filaments compressed, free or connate at base; anthers extrorse, 2-rimose. Female calyx not compressed irregularly 2–3-fid eglandular within. Germen 2–3-locular; cells 1-ovulate; style branches 2, 3, more or less connate at base, apex internally at margin, more or less dilated or recurved. Fruit 2–3-merous sub-coriaceous, indehiscent or with difficulty dehiscing, more rarely capsular-dehiscent (*Wartmannia*<sup>7</sup>); seeds reticulate-sprinkled, furnished at apex with membranous-lacerate or small short aril.<sup>8</sup>—Trees or shrubs; leaves alternate petiolate, sometimes penninerved coriaceous (*Pimbleodendron*<sup>9</sup>, *Stomatocalyx*), usually rhomboid-ovate membranous, generally tuberculate-2-glandular at base; stipules small or 0 (*Stomatocalyx*), usually wide membranous, free or connate among themselves; flowers in spikes or axillary or oftener terminal racemes, simple or more or less ramified; female inferior few; others male generally in axils of bracts cymose. (*Trop. and subtrop. Asia and Oceania.*<sup>10</sup>)

<sup>1</sup> Greenish lutescent.

<sup>2</sup> A genus scarcely distinct from *Exceccaria* except by the number of cells and nature of pericarp.

<sup>3</sup> Spec. 1 v. 2.—L. Spec. 1431.—JACQ. Amer. 250, t. 159.—Sw. Obs. 369.—W. Spec. iv. 571.—A. Rich. Cuba, iii. 200.—GRISEB. Fl. Brit. W.-Ind. 49.—H. Bn. in *Adansonia*, i. 352.

<sup>4</sup> Cat. Hort. Buitenz. 105.—H. Bn. in *Hortie. Franç.* xv. 234; in *Adansonia*, vi. 348, t. 8.—M. ARG. Prodr. 1143.—DUANIA NORONH. Verh. Bat. Gen. v. 65 (ex HASSK. Cat. Hort. Bog. 233).—*Omalanthus* A. JUSS. Euphorb. 50, t. 16, fig. 53 (nec LESS.).—ENDL. Gen. n. 5779.—H. Bn. Euphorb. 537, t. 8, fig. 22–31.—*Dibrachion* REG. in *Gartenfl.* (1866), 100, t. 504.

<sup>5</sup> BARTL. Ord. Nat. 372.

<sup>6</sup> GRIFF. ex M. ARG. in *Linnaea*, xxxiv. 202; Prodr. 1142.

<sup>7</sup> M. ARG. in *Linnaea*, xxxiv. 218; Prodr. 1147.—H. Bn. in *Adansonia*, vi. 349.

<sup>8</sup> The origin of which is always the same, the more or less evolute aril springing at first from exostome.

<sup>9</sup> HASSK. Cat. Hort. Bog. ed. Nov. 68; in *Bull. Soc. Bot. de Fr.* vi. 716.

<sup>10</sup> Spec. ad 12. GEIS. Crot. Mon. 80 (*Croton*).—FORST. Prodr. 67 (*Croton*).—GRAH. in *New Edinb. Journ.* (1827), 175 (*Omalanthus*); in *Bot. Mag.* t. 2780.—BLANCO, *Fl. d. Philipp.* 787.—GUILLEM. in *Ann. Sc. Nat.* sér. 2, vii. 186 (*Omalanthus*).—ZOLL. in *Flora* (1847), 662 (*Homalanthus*).—MIQ. *Fl. Ind.-Bat.* i. p. ii. 413.—M. ARG. in *Flora* (1864), 434; in *Linnaea*, xxxii. 85.—F. MUELL. *Fragm.* i. 32 (*Omalanthus*).—BENTH. *Fl. Austral.* vi. 149.—H. Bn. in *Adansonia*, i. 352; ii. 228; vi. 325.

103. **Omphalea** L.<sup>1</sup>—Flowers monœcious apetalous; calyx 4-5-partite imbricated. Disk wide orbicular entire, apex strictly encircling staminal column. Stamens 2, 3, central; filaments connate in short dilated column hemispherical or disciform incised at margin, bearing 2-locular small anthers; cells vertical extrorsely rimose. Germen in female flower sessile, 3-locular; cells 1-ovulate; style columnar immediately at apex inwardly stigmatiferous. Fruit subfleshy, 3-cocceous; cocci finally dehiscent; seeds subglobose exarillate; cotyledons of thickly albuminous embryo auriculate cordate at base.—Sarmentose shrubs; leaves alternate or sub-opposite, 2-stipulate petiolate, often wide, above base (*Euomphalea*<sup>2</sup>) or below (*Heatea*<sup>3</sup>) glanduliferous, entire or sub-lobed palmate-penninerved; flowers cymulose in simple or ramified racemes the central female; bracts often linear-spathulate, 2-glandular. (*Trop. America, Malucassia*.<sup>4</sup>)

104. **Hura** L.<sup>5</sup>—Flowers monœcious apetalous; calyx cupuliform imbricated; male denticulate. Stamens central, 1-adelphous; column elongated bearing above sessile anthers (cells longitudinally adnate to connective, extrorsely rimose; connective rather thick prominent) 2-or pluriverticillate. Female calyx gamophyllous subentire at mouth. Germen closely surrounded by calyx 5-20-locular; cells 1-ovulate; style large erect cylindrical, afterwards poculiform-dilated, multilacinate at apex; lobes thick reflexed, sub-equal in number to cells, subconical fleshy, outwardly sulcate multi-costate; cocci ligneous-compressed exarillate; radicle of inverse embryo short superior; cotyledons lateral suborbiculate, penninerved auriculate at base.—Handsome trees; leaves alternate petiolate 2-stipulate penninerved glandular-paucidentate; limb 2-glandular at base; male flowers spicate pedunculate, involucrate with spurious bracts;

<sup>1</sup> Gen. n. 1093.—J. Gen. 392.—POIR. Dict. Suppl. iv. 140; Ill. t. 753.—A. JUSS. Euphorb. 54, t. 17, fig. 58.—ENDL. Gen. n. 5793.—H. BN. Euphorb. 527, t. 7, fig. 1-9.—M. ARG. Prodr. 1134.—*Omphalandria* P. BR. Jam. 335.—*Duchola* ADANS. Fam. des Pl. ii. 357.—*Romoia* BUCH. Dics. 18; Dic. iii. t. 8.—*Hebecece* BEURL. Prim. Fl. Portob. 146.

<sup>2</sup> H. BN. Euphorb. 529.

<sup>3</sup> DUP.-TH. Hist. Vég. Iles. Austr. Afr. 27, t. 5; Gen. Nov. Madag. 24.—ENDL. Gen. n. 5794.—H. BN. Euphorb. loc. cit. sect. B.—*Adeno-*

*phyllum* DUP.-TH. Nov. Gen. Madag. loc. cit.

<sup>4</sup> Spec. 8, 9. AVEL. Guian. 843, t. 328.—SW. Obs. 349, t. 10.—TUSS. Fl. Ant. iv. 18, t. 9.—H. BN. in *Adansonia*, v. 335.—M. ARG. in *Linnæa*, xxxii. 86.—GRISEB. in *Nachr. Un. Gœtt.* (1865), 117.

<sup>5</sup> Hort. Cliff. 486, t. 34.—J. Gen. 391.—LAMK. Ill. t. 793.—POIR. Dict. vi. 358.—A. JUSS. Euphorb. 50.—SPACH, Suit. à Buffon, ii. 525, t. 76.—ENDL. Gen. n. 5776.—H. BN. Euphorb. 541, t. 6, fig. 21-35.—M. ARG. Prodr. 1228.

female solitary pedunculate, axillary to leaves or lateral to base of male spikes. (*Trop. West Africa and America*.<sup>1</sup>)

105. **Ophthalmoblapton** ALLEM.<sup>2</sup>—Flowers monœcious; male calyx urceolar, perforated depressed at apex. Stamen 1, central situated at bottom of calyx; filament erect; anthers apiculate, 2-locular, longitudinally rimose. Female sepals 6, thick erect, 2-seriate imbricated, unequal; interior dorsally subearinate or costate. Germen 3-locular; cells opposite exterior sepals; ovule solitary; micropyle extrorse superior, obtected by small obturator; style erect columnar incrassate, concave and inwardly stigmatiferous at apex; opening shortly 3-agonal, 3-labiate. Capsule 3-cocccous; seeds glabrous exarillate; cotyledons of albuminous embryo wide foliaceous, digitinerved at base.—A large tree; juice milky acrid; leaves alternate petiolate oblong-lanceolate, penninerved veined large dentate coriaceous; stipules (as appears) small caducous; buds of branches terminal thick hemispherical resinous; flowers<sup>3</sup> in axillary subsimple or ramified spikes; inferior spikes few or 1, female rather larger; the remaining superior male flowers solitary or glomerulate and springing from the buds of the rachis mouth-shaped from a transverse aperture. (*North Brazil*.<sup>4</sup>)

106. **Tetraplandra** H. BN.<sup>5</sup>—Flowers monœcious; male calyx unequally-3-5-partite, imbricated. Stamen 1, 4-locular, or with 2 anthers inserted at summit of central column dilated and articulate at base, long adnate; cells longitudinally rimose. Female calyx 5-partite imbricated. Germen 3-locular; cells 1-ovulate; style erect, afterwards 3-fid; lobes simple recurved patulate, inwardly much plumose-stigmatiferous. Fruit. . . ?—A tree; leaves alternate petiolate, 2-stipulate; limb at base 2-glandular penninerved; flowers monœcious; male amentiform-spicate, bracts scariose, 1-flowered, at first connate falsely involucrate; female at apex of branches solitary or few sessile, surrounded by few glandular bracts. (*Brazil*.<sup>6</sup>)

<sup>1</sup> Spec. 2, 3. W. *Enum. Pl. Hort. Berol.* 997.—Tuss. *Fl. Ant.* iv. 21.—DESCOURT. *Fl. Ant.* t. 124.—H. BN. in *Adansonia*, i. 77; v. 344.

<sup>2</sup> In *Guanabar.* (dec. 1849), n. 4, c. ic.; in *Ann. Sc. Nat.* sér. 3, xiii. 119; in *Bot. Zeit.* (1854), 457.—H. B. *Euphorb.* 547; in *Adansonia*, xi. 126.—M. ARG. *Prodr.* 1155.

<sup>3</sup> Luteo-virescent.

<sup>4</sup> Spec. 1. *O. macrophyllum* ALLEM. *loc. cit.*—WALP. *Ann.* iii. 361.

<sup>5</sup> *Euphorb.* 549, t. 5, fig. 8-10; in *Ann. Sc. Nat.* sér. 4, ix. 200.—M. ARG. *Prodr.* 1230.

<sup>6</sup> Spec. 1. *T. Leandri* H. BN. *loc. cit.*; in *Adansonia*, v. 344.

107. **Algernonia** H. BN.<sup>1</sup>—Flowers monœcious; male calyx unequally-3-5-lobed, imbricated, thick glandular-incrassate at base. Stamen 1, central; filament not articulate; anthers erect apiculate, 2-dymous, cells 2, long adnate, laterally rimose. Female calyx cupular, glandular-3-denticulate, persistent. Germen 3-locular, unequally-lobate-dilated below apex of cells; cells 1-ovulate, style erect columnar, afterwards 3-fid; lobes simple rather compressed, inwardly stigmatiferous. Fruit suberous-capsular, finally 3-coccous, depressed-turbinate and horizontally as if in sublobed ring dilated-winged, shortly apiculate; seed . . . ?—A small tree; leaves alternate terminal densely spicate; inferior spikes few female. (*North Brazil*.<sup>2</sup>)

108. **Dalembertia** H. BN.<sup>3</sup>—Flowers monœcious apetalous; male 1-androus; filament at first incurved, apex of anther introrse,<sup>4</sup> 2-rimose bearing dorsally and at middle a bractlet,<sup>5</sup> articulate below the insertion of this. Sepals of female flowers 3, sometimes connate at base, small, imbricated, furnished at base with 2 stipulate glands and higher at margin with smaller unequal ones. Gynæceum (of *Excavaria*) 3-merous; cells alternating with sepals; style erect at middle 3-fid; branches recurved or revolute, inwardly stigmatiferous. Capsule 3-coccous; seeds exarillate glabrous.—Undershrubs; leaves alternate petiolate, 2-stipulate, rhomboid, repando-dentate or lobed, more rarely sub-entire; flowers<sup>6</sup> in terminal racemes 1-or 2-sexual; inferior in androgynous the female few; pedicel erect or refracted; bracts imbricate, 1-flowered, apiculate, at base thick 2-glandular. (*Mexico*.<sup>7</sup>)

109. **Anthostema** A. JUSS.<sup>8</sup>—Flowers monœcious; male calyx membranous small, unequally-3-6-dentate. Stamen 1, central filament erect subulate; anthers of terminal cells longitudinally rimose. Calyx of female flowers gamophyllous, 3-5-fid. Germen 3-locular;

<sup>1</sup> *Euphorb.* 546, t. 2, fig. 30-32.—M. ARG. in *Linnaea*, xxxii, 84; *Prodr.* 1230.

<sup>2</sup> Spec. 1. *A. brasiliensis* H. BN. *loc. cit.*; in *Ann. Sc. Nat.* sér. 4, ix, 198.

<sup>3</sup> *Euphorb.* 545, t. 5, fig. 11-15.—M. ARG. in *Linnaea*, xxxiv, 218; *Prodr.* 1225.

<sup>4</sup> Face of anther in bud contiguous to incurved concavitate filament, finally looking at axis of inflorescence.

<sup>5</sup> Bractlet superposed to floral bracts (an "o

duabus lateralibus connata" ARG.) is before anthesis nestled in the concavity of its anther.

<sup>6</sup> Small, virescent.

<sup>7</sup> Spec. ad 4. H. BN. in *Adansonia*, xi, 124; in *Ann. Sc. Nat.* sér. 4, ix, 195.

<sup>8</sup> A. JUSS. *Euphorb.* 56, t. 18, fig. 60.—ENDL. *Gen. n.* 5767.—H. BN. *Euphorb.* 59, 543, t. 5, fig. 1-7; in *Ann. Sc. Nat.* sér. 3, ix, 193.—BOISS. *Prodr.* 188.

cells 1-ovulate; style cylindrical or long conical; branches 3, usually short recurved, 2-lobed at apex; inwardly sulcate and papillose-stigmatiferous. Capsule 3-coecous; cocci 2-valved, 1-spermous; seed subterete or ancipiti-compressed, arillate at micropyle; cotyledons of copiously albuminous embryo foliaceous, sometimes lateral.—Trees; juice milky; leaves alternate penninerved coriaceous; stipules caducous; flowers in short terminal or oftener axillary ramified cymiferous racemes; each cyme sub-capituliform, female flower central, finally laterally dejected involucellate terminal. Bracts of involucl generally 4, furnished at base with lateral sessile discoid glands, finally lateral. Male flowers in axil of each bract cymose; cymes 1-parous; pedicels articulate below calyx; bracts below inflorescence all lateral;<sup>1</sup> each stipate from an axillary glanduliform<sup>2</sup> bud. (*West. trop. Africa, Madagascar.*<sup>3</sup>)

## VI. DICHAPETALEÆ.

110. **Dichapetalum** DUP.-TH.—Flowers hermaphrodite or polygamous 5-merous; receptacle convex, more rarely slightly or sometimes much concave; perianth and hence androeum superior, more rarely semi-inferior or all inferior. Sepals free or connate at base, subequal, imbricated. Petals alternate free equal, cuculate-2-fid or 2-lobed at apex, furnished at middle within with an inflexed tongue or rather prominent vertical rib, induplicate valvate or sub-imbricate. Stamens 5, alternipetalous; filaments free; anthers introrse; connective rather thick; cells longitudinally rimose. Glands of hypogynous disk 5, oppositipetalous, subentire or 2-lobed, free or connate. Germen free, sometimes partly or all inferior and adnate to concave receptacle, 2-3-locular; ovules in cell 2, collaterally descendent; micropyle extrorse superior; obturator small, sometimes rather thick, or 0; style divided above into 2, 3, branches, inwardly stigmatiferous at apex. Fruit dry, coriaceous or drupaceous; putamen 1-3-locular, indehiscant; exocarp more or less fleshy, longitudinally cut between cells. Seeds 1-3; cotyledons of thick fleshy embryo plano-convex; radicle short superior.—Small trees or

<sup>1</sup> Common involucre (A. Juss.).

<sup>3</sup> Spec. 3. H. Bx. in *Adansonia*, i. 78; ii.

<sup>2</sup> Taken for glands of involucre (A. Juss.).

32; v. 366, not.

shrubs, sometimes scandent; leaves alternate petiolate entire penninerved coriaceous; stipules small, caducous; flowers in axillary more or less elongated-ramified axillary racemes; branches composite-cymiferous; peduncle more or less high connate with petiole. (*All warm regions*). See p. 139.

111. **Stephanopodium** PÆPP. and ENDL.—Flowers (nearly of *Dichapetalum*) regular; corolla gamopetalous; tube infundibuliform or sometimes obconical, more rarely (*Isorthosiphon*) cylindrical; lobes equal or unequal, sometimes minute, imbricated. Stamens 5, alternipetalous; anthers introrse subsessile, inserted in throat of corolla. Glands hypogynous 5, free or connate. Germen 2-locular; ovules, fruit seeds and other characters of *Dichapetalum*.—Trees or shrubs; leaves alternate stipulate; flowers in compound glomerules adnate to summit of petiole, congested crowded. (*Trop. America*.) See p. 141.

112. **Tapura** AUBL.—Flowers hermaphrodite irregular (nearly of *Stephanopodium*); corolla gamopetalous; lobes 5, unequal, imbricated, 2 of which are larger, 2-eucullate (*Dichapetalous*), 3 anterior smaller, generally simple. Stamens alternipetalous inserted in throat, of which 3 are usually fertile; the other 2 generally sterile, antherless minute (*Eutapura*), or very rarely 5 fertile, equal (*Dischizolena*). Disk incomplete lateral. Gynæceum, fruit and seed of *Dichapetalum*.—Small trees or shrubs; leaves and inflorescence sub-sessile adnate to summit of petiole of *Stephanopodium*. (*Trop. America, Trop. West. Africa*.) See p. 141.

## VII. PHYLLANTHÆ.

113. **Wielandia** H. BN.—Flowers monœcious regular; male calyx imbricated. Petals 5 longer than calyx, imbricated. Stamens 5, alternipetalous; filaments adnate to central column, free at apex; anthers introrse, finally reflexed, sub-horizontal, 2-rimose. Disk extrastaminal cupular, sometimes 5-agonal before sepals. Rudiment of gynæceum placed at summit of column; branches 5, oppositipetalous stellate radians, 2-fid at apex. Perianth and disk of female flowers as in male. Germen sessile sub-globose; cells 5, oppositipetalous; ovules in each 2; collaterally descendent; micropyle extrorse superior, thickly obturated; style branches 5, stigmatiferous reflexed,

2-lobed at apex. Fruit 5-coccous. . .—A glabrous shrub; leaves alternate petiolate, 2-stipulate, entire penninerved; flowers in short axillary racemes alternately cymose; cymes in axils of bracts or small leaves 1-2-sexual; female cymose or central in 2-sexual cymes; male more numerous slender and shorter pedicellate. (*Insular Eastern trop. Africa, India?*) See p. 142.

114. **Savia** W.<sup>1</sup>—Flowers (nearly of *Wielandia*) monœcious or diœcious (*Eusavia*<sup>2</sup>); calyx imbricated. Petals 5, or fewer by abortion, sub-orbiculate (*Charidia*<sup>3</sup>) or narrow (*Petalodiscus*,<sup>4</sup> *Eusavia*.) Disk annular (*Eusavia*), or of 5 glands, short thick (*Charidia*), sometimes wide petaloid (*Petalodiscus*) constant. Androecium of *Wielandia*. Female perianth and disk as in male flower. Germen 3-locular. Capsular 3-locular; cocci 2-valved. Seeds exarillate; cotyledons of albuminous embryo flat or more or less corrugate, wider than albumen.—Small trees or shrubs; leaves alternate stipulate (of *Wielandia*); flowers in racemes sometimes short cymiferous; female longer and thicker pedicellate than male; rachis of racemes sometimes ancipiti-complanate. (*West. India, Malaccasia*.<sup>5</sup>)

115? **Actephila** BL.<sup>6</sup>—Flowers (nearly of *Savia*) monœcious or diœcious; receptacle sub-plane or rather convex; sepals and petals (whence sometimes perigynous) imbricated. Disk extrastaminal, 5-lobed. Stamens 5, inserted round rudiment of 3-lobed gynœceum; filaments free or more or less high connate; anthers sub-globose; cells short long adnate, usually introrsely rimose. Perianth and disk of female flower as in male. Germen<sup>7</sup> 3-locular; cells 2-ovulate; obturator thick; style branches 3, 2-fid. Capsule 3-coccate; cocci 2-valved. Seeds exarillate; albumen 0, slightly mucous between folds of embryo, radicle short; cotyledons unequal thick; one dorsally convex, the other dorsally wide refracted concave at margin, long sub-involved; or sometimes (*Lithoxylon*) alternately long

<sup>1</sup> Spec. iv. 771 (nec RAFIN.).—A. JUSS. *Euphorb.* 15, t. 2.—ENDL. *Gen.* n. 5866.—H. BN. *Euphorb.* 569 (part.).—M. ARG. *Prodr.* 228 (part.).

<sup>2</sup> H. BN. *Euphorb.* 570, t. 26, fig. 20-23.

<sup>3</sup> H. BN. *loc. cit.* 572.

<sup>4</sup> H. BN. *loc. cit.* 571, t. 22, fig. 11-14.

<sup>5</sup> Spec. ad 12. SW. *Prodr.* 100; *Fl. Ind. Occ.* 1179 (*Croton*).—SPRENG. *Syst.* iii. 903.—A. RICH. *Cuba*, iii. 216, t. 70 (*Phyllanthus*).—GRISEB. *Pl. Wright.* 157; *Fl. Brit. W.-Ind.*

32; in *Nachr. d. Ges. Univ. Gœtt.* (1865), 163.—H. BN. in *Adansonia*, ii. 33; viii. 345.

<sup>6</sup> *Bijdr.* 581.—ENDL. *Gen.* n. 5867.—M. ARG. *Prodr.* 224.—H. BN. in *Adansonia*, vi. 360, t. 10.—*Lithoxylon* ENDL. *Gen.* n. 5863.—H. BN. *Euphorb.* 590.—*Anomospermum* DALZ. in *Hook. Journ.* (1851), 228.

<sup>7</sup> Sometimes surrounded at base by sterile or fertile stamens, 1- or few with short filament and extrorse anther. (*Adansonia*, vi. t. 10, fig. 5.)

spirally many times convolute.—Trees or small trees; leaves alternate penninerved entire stipulate; flowers proceeding from axillary buds; male cymose few or 0; female longer and thicker pedicellate mixed with male few or solitary cymose.<sup>1</sup> (*South Asia and trop. Oceania*.<sup>2</sup>)

116? **Discocarpus** KL.<sup>3</sup>—Flowers diœcious (nearly of *Actephila*); receptacle slightly concave. Sepals 5, sub-perigynous,<sup>4</sup> imbricated. Stamens inserted round rudiment of gynœceum not produced; anthers introrse oblong, afterward exserted. Female calyx 5-phyllous. Petals evolute, rudimentary or partly wanting. Extrastaminal disk, staminodes gynœceum ovules and capsule of *Actephila*; seeds membranous-arillate; cotyledons of exalbuminous embryo foliaceous plicate or sub-convolute.—Trees; twigs spinescent at apex; flowers axillary; male glomerulate; female flowers cymose very shortly pedicellate.<sup>5</sup> (*Trop. South America* <sup>6</sup>)

117. **Amanoa** AUBL.<sup>7</sup>—Flowers monœcious or more rarely diœcious 5-merous rarely 3–6-merous; receptacle more or less sometimes little (*Euamanoa*,<sup>8</sup> *Stenonia*,<sup>9</sup> *Pentabrachium*<sup>10</sup>) concave and cupular. Perianth inserted at margin of receptacle more or less high perigynous; sepals much imbricated or obliquely cut at margin sub-valvate (*Euamanoa*, *Pentabrachium*), oftener all valvate (*Bridelia*,<sup>11</sup> *Lebidieropsis*,<sup>12</sup> *Stenonia*,

<sup>1</sup> A genus much allied to *Savina* (of which it might be a section?), differs by usually slight perigynous character, albumen scarcely mucous or 0, cotyledons large plicate or large and spirally convolute.

<sup>2</sup> Spec. ad 8. WIGHT, *Icon*. t. 1910.—Miq. *Fl. Ind.-Bat.* i. p. ii. 356.—Thw. *Enum. Pl. Zeyl.* 280.—HASSK. *Hort. Bog.* 243 (*Savina*).—LINDL. *Coll. t.* 9 (*Scutrinega*).—H. BN. *Euphorb.* 571 (*Savina*).—M. ARG. in *Linnaea*, xxxii. 77; xxxiv. 65 (*Lithoxylon*).—BENTH. *Fl. Austral.* vi. 88.—H. BN. in *Adansonia*, vi. 330.

<sup>3</sup> In *Erichs. Arch.* vii. 201, t. 9, fig. C; in *Hook. Journ.* (1843), 52.—ENDL. *Gen.* n. 586<sup>11</sup>.

<sup>4</sup>—H. BN. *Euphorb.* 585, t. 22, fig. 1.—M. ARG. *Prodr.* 223.

<sup>5</sup> Usually unequal.

<sup>6</sup> A genus much better made a section of *Actephila* or referred to *Amanoa*.

<sup>7</sup> Spec. 2. M. ARG. in *Linnaea*, xxxii. 78.—H. BN. in *Adansonia*, v. 345.

<sup>8</sup> *Guian.* i. 256, t. 10.—J. *Gen.* 437.—LAMK.

*Dict.* i. 114; *Ill.* t. 767.—ADR. JUSS. *Euphorb.* 15, t. 2, fig. 6.—ENDL. *Gen.* n. 5862.—H. BN. *Euphorb.* 579, t. 26, fig. 48–50; in *Adansonia*, xi. 115.—M. ARG. *Prodr.* 219, 1269 (incl. : *Bridelia* W. *Candelabria* HOCHST. *Cleistanthus* HOOK. F. *Lebidiera* H. BN. *Lebidieropsis* M. ARG. *Leioptyxis* MIQ. *Micropetalum* POIT. *Nanopetalum* HASSK. *Pentabrachium* M. ARG. *Pentameria* KL. *Stenonia* H. BN. *Zarcea*, LLAN.).

<sup>9</sup> H. BN. *Euphorb.* 580, sect. 1.—*Amanoa* M. ARG. *Prodr.* 219.

<sup>10</sup> H. BN. *Euphorb.* 578, t. 22, fig. 2–9; in *Adansonia*, xi. 116.—M. ARG. *Prodr.* 511.

<sup>11</sup> M. ARG. in *Flora* (1864), 532; *Prodr.* 223.

<sup>12</sup> W. *Spec.* iv. 979.—A. JUSS. *Euphorb.* 26, t. 7, fig. 22 (*Bridelia*).—ENDL. *Gen.* n. 5839.—H. BN. *Euphorb.* 582, t. 25, fig. 25–33.—M. ARG. *Prodr.* 492.—*Zarcea* LLAN. in *Mem. Ac. Cienc. Madrid*, iv. 501.—*Candelabria* HOCHST. in *Flora* (1843), i. 79.—*Pentameria* KL. ex H. BN. in *Adansonia*, ii. 39.

<sup>13</sup> M. ARG. in *Linnaea*, xxxii. 79; *Prodr.* 509.



*Nanopetalum*,<sup>1</sup> *Cleistanthus*<sup>2</sup>). Petals alternating with sepals, generally small short, often subrhomboid, variously 3-5-lobed, attenuated at base, often subspathulate, usually not contiguous, more rarely imbricated. Disk subsimple or duplex, covering interior of receptacle, outwardly more or less prominent-lobed between the petals, ascending within female flower generally high, more or less loosely encircling germen, finally persisting round the base of fruit, 3-angular 5-lobed or dentate. Stamens (in female flower rudimentary, sterile or 0) equal in number to petals at summit of central or elongated thin or more rarely thick short column, verticillate inserted below rather long rudimentary gynæceum; filaments free; anthers introrse, 2-rimose. Germen (in male flower rudimentary) 2-3-locular; cells 2-ovulate; style branches 2, 3 stigmatiferous at apex, 2-lobed or 2-fid. Fruit 2-3-cocceous, either capsular (*Cleistanthus*, *Nanopetalum*, *Lebidieropsis*), sometimes outwardly more or less fleshy, with difficulty or late dehiscing (*Euamanoa*), or more rarely fleshy or subbaccate, indehiscent (*Bridelia*). Seeds impressed at hilum or not impressed, exalbuminous (*Euamanoa*, *Nanopetalum*), or albuminous (*Cleistanthus*, *Bridelia*, *Lebidieropsis*) exarillate; cotyledons of more or less evolute embryo in exalbuminous seed thick flat (*Lebidieropsis*), foliaceous-complanate, straight (*Bridelia*) or folded (*Cleistanthus*).—Trees or shrubs; leaves alternate petiolate or sessile, entire or dentate, glabrous or pilose, penninerved-veined, 2-stipulate; flowers in axils of leaves or sometimes evolute leaf-shaped bracts, cymose or glomerulate, bracteate; inflorescence simple or ramified, sometimes spike-shaped or substrobiliform; bracts and bractlets imbricated<sup>3</sup>. (*All trop. regions*.<sup>4</sup>)

# 118. *Andrachne* L.<sup>5</sup>—Flowers monœcious, sometimes apetalous

<sup>1</sup> HASSK. in *Verh. Kæn. Ac. Amst.* iv. 140; in *Bull. Soc. Bot. de Fr.* vi. 716; in *Bot. Zeit.* (1858), 803; in *Flora* (1857), 534; *Retzia*, 65.—M. ARG. *Prodr.* 510.

<sup>2</sup> Hook. F. in *Hook. Icon.* t. 779.—*Candelabria* PL. in *Ann. Sc. Nat. sér. 4*, ii. 264 (nec HOCHST.).—*Lebidiera* H. BN. *Euphorb. Atl.* 50, t. 27, fig. 1-4.—*Leioptyxis* MIZ. *Fl. Ind.-Bat. Suppl.* 445.

<sup>3</sup> Sect. 7: 1. *Euamanoa* (H. BN.); 2. *Pentabrachium* (M. ARG.); 3. *Stenonia* (H. BN.); 4. *Nanopetalum* (HASSK.); 5. *Candelabria* (HOCHST.); 6. *Lebidieropsis* (M. ARG.); 7. *Bridelia* (W.).

<sup>4</sup> Spec. about 50. L. *Spec.* 1475 (*Clutia*).—ROXB. *Pl. Coromand.* ii. 37, t. 169, 170; iii. t. 171-173 (*Clutia*).—BL. *Bijdr.* 597 (*Bridelia*).—PL. in *Hook. Icon.* t. 797.—WIGHT, *Icon.* t. 1911.—BERTOL. F. *Mozamb.* 4, 16, t. 6.—M. ARG. in *Seem. Journ.* i. 327; in *Flora* (1864), 515 (*Bridelia*).—THW.; *Enum. Pl. Zeyl.* 274 (*Bridelia*), 280.—BENTH. *Fl. Austral.* vi. 119 (*Bridelia*), 121 (*Cleistanthus*).—H. BN. in *Adansonias*, i. 79; ii. 36, 37 (*Bridelia*), 229 (*Bridelia*); iii. 164 (*Bridelia*); vi. 345; vi. 335.

<sup>5</sup> Gen. n. 709.—J. Gen. 387.—GÆRTN. *Fruet.* ii. 124, t. 108.—LAMK. *Dict.* i. 152; *Suppl.* i. 348; *Ill.* t. 797.—A. JUSS. *Euphorb.* 24, t. 6,

(*Cluytiandra*<sup>1</sup>); receptacle convex or rather concave. Perianth hypogynous or slightly perigynous, generally 5-merous; sepals imbricated; petals imbricated or narrow not touching. Glands of extrastaminal disk oppositipetalous, free or connate in membranous crenate urecolum. Stamens 5, alternipetalous, inserted on receptacle scarcely or not at all elevated above variously shaped rudimentary gynæceum; filaments free or oftener 1-adelphous; anthers introrse or lateral; cells short longitudinally rimose. Germen 3-locular; cells 2-ovulate; style branches 3, stigmatiferous, 2-fid or 2-lobed at apex. Capsule 3-coccous; seeds albuminous exarillate.—Shrubs, undershrubs or herbs; stem erect or decumbent; leaves alternate stipulate penninerved or sub-3-nerved; flowers<sup>2</sup> axillary solitary or cymose, more rarely in cymiferous racemes; female pedicels thicker longer.<sup>3</sup> (*All warm and temp. regions.*<sup>4</sup>)

119. **Poranthera** RUDGE.<sup>5</sup>—Flowers monœcious; receptacle subplane or rather convex. Sepals 5, imbricated and petals same in number, shorter, imbricated. Glands of disk 5, oppositipetalous, 2-lobed. Stamens 5, alternipetalous; filaments from three laminae under rudimentary gynæceum membranous subpaleaceous constantly obovate, free finally elongated and much incurved; anthers basifixed; cells 4, shortly subporicide rimose at apex. Germen 3-locular; cells 2-ovulate; style branches 3 from base, 2-partite papillose stigmatiferous. Capsule 3-coccous; seeds generally 6, subglobose foveolate; semicylindrical cotyledons of terete embryo subequal to or shorter than radicle.—Herbs or ericoid undershrubs, erect or diffuse ramified; leaves alternate stipulate narrow linear;

fig. 29.—NEES, *Gen.* ii. t. 39.—ENDL. *Gen.* n. 5841.—H. BN. *Euphorb.* 575, t. 27, fig. 18.—M. ARG. *Prodr.* 232.—*Telephioides* T. *Inst. Cor.* 50, t. 485.—*Arachne* NECK. *Elem.* n. 1146.—*Erac-lissa* FORSK. *Descr. Oeg.-Arab.* 208.—*Lineum* FORSK. *loc. cit.* (nec L.).—*Maschalanthus* NUTT. *Fl. Arkans.* (nec AUCT.).—*Leptopus* DCNE. in *Voy. Jacquem. Bot.* iv. 155, t. 156.—*Lepidanthus* NUTT. MSS. (ex TORR. *Mex. Bound. Sure.* 193).—*Phyllanthopsis* SCHEEL. in *Linnaea*, xxv. 584.—*Phyllanthideu* DIEDK. *Fl. nonn. Mus. havn.* (1853), 29.

<sup>1</sup> M. ARG. in *Seem. Journ.* (1864), 328; *Prodr.* 225.

<sup>2</sup> Small usually greenish yellowish or whitish.

<sup>3</sup> A genus hence nearly allied to *Phyllanthus*

whence to *Amanoa*, differing from the section, with hypogynous oppositipetalous glands by habit.

<sup>4</sup> Spec. about 12 LAMK. *Dict.* ii. 212, n. 35 (*Croton*).—SPRENG. *Syst.* iii. 884.—SINTH. *Fl. Græc.* x. t. 953.—REICHB.  *Ic. Fl. Germ.* v. fig. 4807.—DCNE. in *Ann. Mus.* iii. 484.—SCHEEL, in *Linnaea*, xxv. 583 (*Cluytia*).—SOND. in *Linnaea*, xxiii. 135 (*Phyllanthus*).—BGE. *Enum. Pl. Chin.* 59.—KL. in *Walden. Reis.* 117, t. 24 (*Phyllanthus*).—MIG. *Fl. Ind.-Bat.* i. p. ii. 365.—BOISS. *Diagn. Pl. Or.* vii. 86.—M. ARG. in *Linnaea*, xxxii. 78.—H. BN. in *Adansonia*, iii. 153; vi. 334.

<sup>5</sup> In *Trans. Linn. Soc.* x. 302, t. 22, fig. 2.—AD. BR. in *Ann. Sc. Nat.* sér. 1, xxix. 383.—ENDL. *Gen.* n. 5859.—H. BN. *Euphorb.* 573, t. 25, fig. 1-9.—M. ARG. *Prodr.* 191.

flowers<sup>1</sup> at summit of branches racemose or subumbellate, solitary in axils of superior leaves or bracts; inferior female, others male. (*Australia*.<sup>2</sup>)

120? **Lachnostylis** TURCZ.<sup>3</sup>—Flowers (nearly of *Andrachne* or *Amanoa*<sup>4</sup>); receptacle subplane or very shortly cupular. Sepals and petals 5, imbricated. Disk extrastaminal. Stamens 5, alternating with petals, verticillate, inserted below 3-fid rudiment of gynæceum at summit of central column; anthers introrse, 2-rimose. Germen 3-locular; cells 2-ovulate; obturator thick; style-branches 2-fid. Capsule 3-cocceous; seeds...? A densely ramified shrub; leaves alternate penninerved entire subcoriaceous minutely stipulate; flowers axillary; male cymose; female solitary.<sup>5</sup> (*South Africa*.<sup>6</sup>)

121. **Payeria** H. BN.<sup>7</sup>—Flowers diœcious; male...? Female calyx gamophyllous campanulate, shortly 5-dentate, valvate (?). Petals 5, alternating with teeth of calyx, shorter included squamiform imbricated. Disk hypogynous evolute subcampanulate, entire or unequally lobed, adpressed to germen. Germen<sup>8</sup> free; cells 5, 2-ovulate,<sup>9</sup> opposite teeth of calyx; style erect subentire stigmatiferous at apex. Capsule 5-cocceous, 10-costate, surrounded by persistent perianth and disk; cocci 1-2-spermous; radicle of albuminous curved embryo conical superior.—Trees; leaves alternate or opposite exstipulate (?) entire penninerved; female flowers in axillary racemes more or less ramified cymiferous. (*Malaccassia*, *Mascarene Is.*<sup>10</sup>)

122. **Caletia** H. BN.<sup>11</sup>—Flowers monœcious; sepals 6, alternately verticillate imbricated; the interior larger subpetaloid. Stamens 6, 2-seriate, opposite sepals, filaments free inserted round rudiment of

<sup>1</sup> Small white, sepals subpetaloid.

<sup>2</sup> Spec. 5, 6. AD. BN. in *Voy. Coq. Bot.* 218, t. 50.—KL. in *Lehm. Pl. Preiss.* ii. 230.—HUGO. in *Bot. Arch.* t. 8.—SOND. in *Linnaea*, xxviii. 567.—BENTH. *Fl. Austral.* vi. 54.—H. BN. in *Adansonias*, vi. 331.

<sup>3</sup> In *Bull. Mosc.* (1846), 503; in *Flora* (1848), 300; in *Linnaea*, xxiii. 131.—SOND. in *Linnaea*, xxiii. 131.—H. BN. *Euphorb.* 224.—M. ARG. *Prodr.* 224.

<sup>4</sup> Especially allied to *Stenonia*; receptacle the same; differs principally by æstivation of calyx.

<sup>5</sup> A genus better made a section of *Amanoa* (?).

<sup>6</sup> Spec. 1. *L. hirta* M. ARG.—*L. capensis* TURCZ.—*L. minor* SOND.—*Clusia hirta* L. *Suppl.* 432.—VAHL, *Symb.* ii. 101.—*C. acuminata* THUNB. *Prodr.* 53; *Fl. Cap.* ed. SCH. 272.

<sup>7</sup> In *Adansonias*, i. 50, t. 3.—M. ARG. in *Linnaea*, xxxiv. 65; *Prodr.* 226.

<sup>8</sup> Nearly of *Glochidion*.

<sup>9</sup> Ovula subhemitropous descendent.

<sup>10</sup> 2 species, of which one (borbonica) is distinguished by the aureate hairs of germen.

<sup>11</sup> *Euphorb.* 553, t. 26, fig. 1-18... M. ARG. *Prodr.* 194.

gynæceum glandular at margin in 3-lobes, opposite exterior sepals, emarginate 2-lobed, incised; anthers ellipsoidal extrorse 2-rimose. Germen surrounded by thin annular, hypogynous disk; cells 3, 2-ovulate; obturator thick; seeds exarillate albuminous.—Shrubs or undershrubs divaricate-ramified or very ramified; leaves simple entire narrow (subericoid) penninerved, sometimes sessile, 3-foliolate; stipules narrow or not conspicuous; flowers<sup>1</sup> in dense cushion axillary cymose; female often solitary.<sup>2</sup> (*Australia, Tasmania*.<sup>3</sup>)

123. **Micrantheum** DESF.<sup>4</sup> — Flowers diœcious (nearly of *Caletia*); stamens 3, opposite exterior sepals. Rudiment of gynæceum glandular 3-lobed, opposite interior larger sepals. Other characters of *Caletia*.—An ericoid virgate-ramified shrub; leaves alternate narrow rigid stipulate; inflorescence of *Caletia*. (*Australia*.<sup>5</sup>)

124? **Choriceras** H. BN.<sup>6</sup>—Flowers diœcious (nearly of *Caletia*) or monœcious (?) folioles of imbricated calyx 6, 2-seriate; exterior in male flower short. Stamens 6, (or 5, 7); filaments free inserted round base, of slightly thickened rudiment of gynæceum conical-cylindrical entire recurved at apex; anthers extrorse; cells adnate, rimose. Staminodes (or bacillar glands?) 3 in the female flowers placed before interior sepals, hypogynous erect, incrassate at base. Germen sessile; cells 3 alternating with staminodes free above from middle and each revolute in free style attenuate at apex stigmatiferous within; ovules in each 2-nate, inserted at middle of internal angle; micropyle extrorse superior; obturator rather fleshy fornicate. Fruit 3-coccous, crowned with 3 discrete peripheral horns; columella short thin; cells finally 2-valved; seeds in each 1, 2, exarillate.—A shrub, branches opposite the younger one villulose. leaves opposite, shortly petiolate, exstipulate penninerved; flowers in

<sup>1</sup> Whitish.

<sup>2</sup> Sect. 2. (M. ARG.): 1. *Encaletia*, leaves 3-foliolate; 2. *Microcaletia*, leaves simple.

<sup>3</sup> Spec. 4 (ex BENTH. 1). HOOK. F. in *Hook. Lond. Journ.* vi. 283 (*Micrantheum*).—F. MUELL. in *Trans. Phil. Soc. Viet.* (1857), ii. 66 (*Pseudanthus*).—M. ARG. in *Flora* (1864), 486; in *Linnaea*, xxxii. 79; xxxiv. 55.—BENTH. *Fl. Austral.* vi. 57, n. 2 (*Micrantheum*); 59, n. 2; 60, n. 4, 5 (*Pseudanthus*); 62, n. 1 (*Stachystemon*).—H. BN. in *Adansonia*, vi. 326.

<sup>4</sup> In *Mém. Mus.* iv. 253, t. 14.—IAMK. *III.* iii.

Suppl. 706, t. 994 (*Micranthea*).—A. JUSS. *Euphorb.* 24.—ENDL. *Gen.* n. 5845.—H. BN. *Euphorb.* 555, t. 26, fig. 19.—M. ARG. *Prodr.* 195.

<sup>5</sup> Spec. 1 *M. ericioides* DESF. loc. cit.—SPRENG. *Syst.* iv. 835.—H. BN. in *Adansonia*, vi. 328.—BENTH. *Fl. Austral.* vi. 57, n. 1. The other species enumerated by various authors and by us referred to *Caletia* being excluded.—N. *boyniaceum* F. MUELL. *Fragm.* i. 32.

<sup>6</sup> In *Adansonia*, xi, 119.

axillary cymes; male crowded; female few longer pedicellate, 2-cho-  
tomous cymose. (*Australia*.<sup>1</sup>)

125. **Pseudanthus** SPRENG.<sup>2</sup>—Flowers monœcious apetalous (nearly of *Caletia*); sepals 6, 2-seriate imbricated; interior subpetaloid or like exterior. Stamens on elevated central receptacle; filaments long 1-adelphous adnate to central column; anthers extrorse; cells discrete, inserted at summit of 2-furcate filament, longitudinally rimose. Disk in flower of either sex evolute (*Chrysostemon*<sup>3</sup>); glands sometimes between stamens few (*Caletopsis*<sup>4</sup>) or 0 (*Eupseudanthus*<sup>5</sup>). Germen 2-3-locular; cells 2-ovulate; style branches 2, 3, simple strong, inwardly caniculate. Capsule 2-3-coecous; seeds in cocci 1, 2, arillate at micropyle; cotyledons of albuminous embryo semicylindrical narrow.—Virgate undershrubs; leaves alternate or more rarely (*Caletopsis*, *Chrysostemon*) opposite or subverticillate, narrow acute entire rigid (ericoid) stipulate; flowers<sup>6</sup> cymose or solitary, either in small axillary cushions, or sometimes crowded at apex of branches.<sup>7</sup> (*Australia*.<sup>8</sup>)

126. **Stachystemon** PL.<sup>9</sup>—Flowers monœcious apetalous (nearly of *Pseudanthus*); sepals 5, 6, imbricated. Stamens  $\infty$ ; filaments inserted on elongated central column; anthers extrorse; cells discrete in tubercles sessile to filaments, often finally oblique,<sup>10</sup> longitudinally rimose. Gynæceum, fruit and seeds of *Pseudanthus*.—Small much ramified ericoid shrubs; leaves alternate linear-narrow glabrous, 1-nerved-stipulate; flowers in superior axils, crowded, female fewer mixed with male. (*Australia*.<sup>11</sup>)

127. **Securinea** J.<sup>12</sup>—Flowers monœcious or oftener dioecious

<sup>1</sup> Spec. 1. *C. australiana* H. BN. loc. cit. (an *Dissiliaria tricornis* BENTH. *Fl. Austral.* vi. 91 ?).

<sup>2</sup> *Syst. Cur. Post.* 25.—GUILLEM. in *Diet. Hist. Nat.* xiv. 318.—ENDL. in *Flora* (1832), 392; *Atakt.* t. 11; *Gen.* n. 5845<sup>1</sup>.—DONE. in *Ann. Sc. Nat.* sér. 2, xii. 155.—H. BN. *Euphorb.* 556, t. 25, fig. 16-21.—M. ARG. in *Linnaea*, xxxiv. 55; *Prodr.* 196.

<sup>3</sup> KL. in *Lehm. Fl. Preiss.* ii. 322.—ENDL. *Gen.* n. 6859<sup>1</sup>.—H. BN. *Euphorb.* 655.—*Chorizotheca* M. ARG. in *Linnaea*, xxxii. 76.

<sup>4</sup> M. ARG. *Prodr.* 197.

<sup>5</sup> M. ARG. in *Linnaea*, xxxiv. 55.

<sup>6</sup> Small virescent or often purpurecent or yellowish.

<sup>7</sup> Sect. 3 (M. ARG.): 1. *Eupseudanthus*; 2. *Chrysostemon*; 3. *Caletopsis*.

<sup>8</sup> Spec. about 7. F. MUELL. *Fragm.* ii. 14, 153.—BENTH. *Fl. Austral.* vi. 58 (part.).—H. BN. in *Adansonia*, vi. 328.

<sup>9</sup> In *Hook. Journ.* (1845), 471, t. 15.—H. BN. *Euphorb.* 560.—M. ARG. in *Linnaea*, xxxii. 76; *Prodr.* 198.

<sup>10</sup> Rather rough rigidly membranous, very dusky coloured.

<sup>11</sup> Spec. 2. BENTH. *Fl. Austral.* vi. 62, n. 2, 3.—H. BN. in *Adansonia*, vi. 329.

<sup>12</sup> *J. Gen.* 388 (nec LINDL.).—POIR. *Diet.* vii. 631.—A. JUSS. *Euphorb.* 14, t. 2, fig. 4.—ENDL. *Gen.* n. 5864.—H. BN. *Euphorb.* 588, t. 26, fig. 33-38.—M. ARG. *Prodr.* 446, 1273 (incl. : *Bes-sera* SPRENG. *Colmeiroa* REUT. *Flueggea* W. *Geblera* FISCH. *Meineckia* H. BN. *Neorapera* F. MUELL. *Villanova* POURR.).—BAKER, *Fl. Maurit.* 397.

apetalous;<sup>1</sup> sepals usually 5, imbricated, sometimes 6, 2-seriate (*Colmeiroa*.<sup>2</sup>) Glands of disk 5, alternating with sepals, free or connate in cup or ring. Stamens 5, opposite sepals; filaments inserted round rudiment of gynæceum; anthers 2-locular; cells long adnate introrsely longitudinally (*Securinegastrum*<sup>3</sup>) or sublaterally (*Gelfuga*<sup>4</sup>), usually extrorsely (*Fluggea*<sup>5</sup>) rimose. Germen 2-3-locular, in male flower rudimentary, 2-3-partite, sometimes radiate produced between base of stamens (*Neoræpera*<sup>6</sup>), surrounded by disk (sometimes very small);<sup>7</sup> cells 2-ovulate; style branches 2, 3, stigmatiferous, 2-fid or 2-lobed at apex. Fruit capsular, 2-3-coccus, rarely subfleshy, and finally late or with difficulty dehiscing; sometimes more rarely baccate indehiscent; seeds smooth, often 3-agonal; cotyledons of albuminous embryo flat foliaceous.—Small trees or shrubs; branches 2-stichous, sometimes spinescent at apex; leaves alternate stipulate; flowers<sup>8</sup> axillary in 1-2- sexual cymes or glomerules.<sup>9</sup> (*All hot and temp. regions*.<sup>10</sup>)

128. **Antidesma** BURM.<sup>11</sup>—Flowers dioecious, 3-8- or oftener 5-merous; calyx lobes free at varied height, sometimes connate nearly to apex; præfloration imbricated. Petals usually 0, rarely more or less evolute (*Antipetalum*.<sup>12</sup>) Stamens usually the same in number as calyx lobes, more rarely more numerous or fewer (2-4); filaments

<sup>1</sup> Petals? sometimes the very minute subulate granduliform female ones are to be seen in *Meineckia* which, as it seems, ARG. scarcely denies to be constant, referring the genus to *Securinega*.

<sup>2</sup> REUT. in *Mém. Soc. Phys. Genève*, x. 240, tab.—ENDL. *Gen.* n. 5865<sup>1</sup> (*Colmeiroa*).—H. BN. *Euphorb.* 558, t. 23, fig. 26-28.—*Villanova Pourr.* (ex CUTAND. *Fl. Madr.* 595).

<sup>3</sup> M. ARG. *Prodr.* 447, sect. 1.

<sup>4</sup> H. BN. *Euphorb.* 593, sect. 3.

<sup>5</sup> W. Spec. iv. 757 (*Fluggea*).—A. JUSS. *Euphorb.* 16; t. 2, fig. 6.—ENDL. *Gen.* n. 5860.—H. BN. *Euphorb.* 596, t. 26, fig. 39-47.—*Bessera Spreng. Pugill.* ii. 90.—*Gehlera Fisch. et. MEY. Ind. Sem. Hort. Petrop.* (1835), 28.—ENDL. *Gen.* n. 5865.—*Meineckia* H. BN. *Euphorb.* 586.

<sup>6</sup> M. ARG. et F. MUELL. *Prodr.* 488.

<sup>7</sup> In *Neoræpera* the female flower often unequally 3-grandular.

<sup>8</sup> Very small, usually greenish or whitish.

<sup>9</sup> A genus differing from *Phyllanthus* by rudimentary gynæceum and male flowers.

<sup>10</sup> Spec. about 16, of which 2, 3, are American. —P. BR. *Jam.* 355 (*Acidoton*).—POIR. *Dict.* iv. 463, n. 4 (*Rhamnus*); *Suppl.* i. 132, n. 4.

(*Adelia*); iv. 404, n. 2 (*Phyllanthus*).—W. Spec. iii. 758 (*Phyllanthus*); iv. 761; *Enum. Pl. Berol.* 329 (*Xylophylla*).—SPRENG. *Syst.* i. 940; iii. 902 (*Drypetes*).—AIT. *Hort. Kew.* i. 376 (*Xylophylla*).—BLANC. *Fl. de Filip.* 486 (*Cicca*).—LEDEB. *Fl. Ross.* iii. 583 (*Gehlera*).—BL. *Bijdr.* 580 (*Fluggea*).—SCHUM. et THÖNN. *Beskr.* 415 (*Phyllanthus*).—A. RICH. *Tent. Fl. Abyss.* ii. 256.—THW. *Enum. Pl. Zeyl.* 281 (*Fluggea*).—BENTH. *Fl. Austral.* vi. 115, 116 (*Neoræpera*).—H. BN. in *Adansonia*, i. 80; ii. 41; iii. 164; v. 346.

<sup>11</sup> *Thes. Zeyl.* 22.—L. *Gen.* n. 1110 (part.).—J. *Gen.* 443.—GÆRTN. *Fruct.* i. 188, t. 39.—LAMK. *Dict.* i. 206; *Suppl.* i. 402; *III.* t. 812.—ENDL. *Gen.* n. 1892.—LINDL. *Veg. Kingd.* 259.—TUL. in *Ann. Sc. Nat.* sér. 3, xv. 182.—SCHNIZL. *Icon.* fasc. 6.—H. BN. in *Bull. Soc. Bot. de Fr.* iv. 987; *Euphorb.* 611; in *Adansonia*, xi. 95.—M. ARG. *Prodr.* 247.—BAKER, *Fl. Maurit.* 305.—*Stilago* SCHREB. in *L. Gen.* ed. 8, n. 1381.—*Minutalia* FENZL. in *Flora* (1844), i. 312.—*Bestram* ADANS. *Fam. des Pl.* ii. 354 (incl.: *Cyathogyne* M. ARG. *Hieronyma* MART. *Leptonema* A. JUSS. *Stilaginella* TUL. *Thecacosia* A. JUSS.).

<sup>12</sup> M. ARG. in *Flora* (1864), 540; *Prodr.* 246.

free inserted below rudimentary gynæceum, finally much superior to calyx; anther cells 2, in bud pendulous from apex of introrse or extrorse filament, in flowers evolute oscillating-superior free, longitudinally rimose. Glands of disk more or less, sometimes very little (*Cyathogyne*<sup>1</sup>) evolute, alternating with calyx lobes and stamens, free or more or less connate among themselves, outwardly from calyx more or less prominent. Germen rudimentary simple or at apex 2-3-lobed, sometimes meagre (*Leptonema*<sup>2</sup>) or dilated rather concave, sometimes large evolute cyathiform (*Cyathogyne*). Perianth of female flowers as in male. Glands of disk usually connate in continuous disk more rarely free. Germen central, 3-5-locular (*Thecacoris*,<sup>3</sup> *Leptonema*,<sup>4</sup> *Cyathogyne*) or 2-locular (*Hieronyma*<sup>5</sup>) usually 1-locular (*Stilago*); style erect; lobes or branches 2, 3, more or less elongated and variously 2-fid inwardly stigmatiferous. Ovules in cells 2, collaterally descendent; micropyle extrorse superior obturated. Fruit indehiscent; more or less fleshy or more rarely capsular-dehiscent (*Thecacoris*, *Leptonema*), 1-3-5-locular; seeds albuminous exarillate.—Trees or shrubs, sometimes rarely subherbaceous, at base lignescant (*Cyathogyne*); leaves alternate simple penninerved,<sup>6</sup> shortly petiolate, 2-stipulate; flowers spicate or racemose small; pedicels articulate, bracteate at base.<sup>7</sup> (*All trop. and subtrop. regions*.<sup>8</sup>)

## 129. *Aporosa* BL.<sup>9</sup>—Flowers diœcious apetalous, eglandular, 3-6-

<sup>1</sup> M. ARG. in *Flora*, loc. cit. 536.—*Prodr.* 226. H. BN. in *Adansonia*, xi. 97.

<sup>2</sup> A. JUSS. *Euphorb.* 19, t. 4. fig. 12.—ENDL. *Gen.* n. 5852.—H. BN. *Euphorb.* 609.—M. ARG. *Prodr.* 445. (Anthers quite the same as in *Antidesma*. Stamens said to be central, but certainly to be observed in 3 slender partite branches below rudiment of gynæceum.)

<sup>3</sup> A. JUSS. *Euphorb.* 12, t. 1, fig. 1.—ENDL. *Gen.* n. 5871.—H. BN. *Euphorb.* 605; in *Adansonia*, xi. 97.—M. ARG. in *Linnaea* (1864), 519; *Prodr.* 245.

<sup>4</sup> In *Leptonema*, cells 3-5.

<sup>5</sup> ALLEM. in *Trab. Soc. Vellos.* (1848), c. ic.; in *Bot. Zeit.* (1854), 456.—H. BN. *Euphorb.* 658; in *Adansonia*, xi. 96.—M. ARG. *Prodr.* 268.—*Stilaginella* TUL. in *Ann. Sc. Nat. sér. 3*, xv. 240.—H. BN. in *Bull. Soc. Bot. de Fr.* iv. 990; *Euphorb.* 603.

<sup>6</sup> Secund ribs usually joined among themselves at margin and arched-ascendent.

<sup>7</sup> Sect. according to us 5, i.e.: 1. *Bumies* (*Antidesma* AUCTT.); 2. *Hieronyma* (ALLEM.);

3. *Antipetalum* (M. ARG.); 4. *Thecacoris* (A. JUSS.); 5. *Leptonema* (A. JUSS.).

<sup>8</sup> Spec. about 70. POIR. *Diet.* vi. 204, n. 5 (*Acalypha*).—GEIS. *Crot. Mon.* 42 (*Croton*).—BL. *Bijdr.* 1123.—JACK. in *Calc. Journ. of Nat. Hist.* iv. 229.—ROXB. *Pl. Coromand.* ii. 35, t. 167; *Fl. Ind.* iii. 769.—PREST. *Epimel.* 232.—SIEB. et ZUCC. *Fl. Jap. Fam.* 88.—TUL. in *Mart. Fl. Bras.* fasc. xxvii. 331 (*Hieronyma*).—GRISEN. *Fl. Brit. W.-Ind.* 32; *Pl. Wright*, 157 (*Hieronyma*).—THW. *Enum. Pl. Zeyl.* 289.—MIRA. *Fl. Ind. Bat. Suppl.* i. 465; in *Ann. Mus. Lugd.-Bat.* i. 218.—M. ARG. in *Linnaea*, xxxiv. 66, 157 (*Hieronyma*); in *Flora* (1864), 529; in *Scem. Journ.* (1864), 328 (*Thecacoris*).—BENTH. *Fl. Austral.* vi. 84.—H. BN. in *Adansonia*, i. 82; ii. 44, 46 (*Thecacoris*), 47 (*Leptonema*), nec. 234; iii. 164; v. 349 (*Hieronyma*); vi. 337.

<sup>9</sup> *Bijdr.* 514.—ENDL. *Gen.* n. 7877.—H. BN. *Euphorb.* 643.—M. ARG. *Prodr.* 469.—*Leiocarpus* BL. *Bijdr.* 581.—H. BN. *op. cit.* 655.—HASSK. in *Bull. Soc. Bot. de Fr.* vi. 714.—*Scepa* LINDL. *Nat. Syst.* ed. 2, 441; *Veg. Kûnd.* 283, fig. 95.—

merous; male calyx imbricated, sometimes various cornered and more or less angular from pressure more rarely very small subnil or 0. Stamens usually 2, or more rarely 3-5, inserted round rudiment of gynæceum minute (or 0); filaments free; anthers introrse or subintrorse; cells short adnate, usually subglobose, longitudinally rimose. Female flowers 2-5-merous. Germen sessile, 2-3-locular; style short, afterwards divided into 2, or 3 lobes variously 2-fid dilated revolute, inwardly decidedly lacinulate-papillose, ovules in cells 2, collaterally descendent; micropyle extrorse superior and thickly obturated. Fruit usually thick finally partly opening like a capsule; cocci 2, 3, or by abortion, 1-2-spermous; seeds copiously albuminous; radicle of straight embryo much thinner than foliaceous cotyledons.—Trees or small trees; leaves alternate stipulate entire or repando-dentate penninerved; petiole sometimes 2-glandular at apex; flowers in densely imbricated-bracteate spikes; bracts 1-3 or more rarely  $\infty$ -flowered 2-bracteolate. (*Trop. Asia and Oceania*.<sup>1</sup>)

130? **Cometia** DUP.-TH.<sup>2</sup>—Flowers (nearly of *Aporosa*) diœcious, 3-5-merous; calyx imbricated, sometimes unequal in bud from compression. Stamens 3-5; filaments inserted below erect rudiment of gynæceum, dilated at apex; anthers introrsely rimose, obtuse at apex. Female calyx...? Germen excentric 1-locular; style from base dilated suborbicular excentric rather fleshy papillose-stigmatiferous above. Ovules in cell 2, collaterally descendent; micropyle extrorse superior thickly obturated. Fruit drupaceous; endocarp hard; mesocarp fleshy thick. Seed usually 1, exarillate; cotyledons of copiously albuminous embryo foliaceous.—Small glabrous trees; leaves alternate petiolate entire penninerved; male flowers in amenta glomerate at the axils of the leaves; bracts of amentum crowded strictly imbricated, 1-3-flowered; female flowers few in terminal axillary racemes.<sup>3</sup> (*Malacassia*.<sup>4</sup>)

ENDL. *Gen.* n. 1897.—P.L. in *Ann. Sc. Nat.* sér. 4, ii. 265.—SCHNIZL. *Icon.* fasc. 6.—H. BN. in *Bull. Soc. Bot. de Fr.* iv. (1857), 993.—*Lepidostachys* LINDL. *Nat. Syst. loc. cit.*—ENDL. *Gen.* n. 1897.—TUL. in *Ann. Sc. Nat.* sér. 3, xv. 253.—H. BN. in *Bull. Soc. Bot. de Fr.* iv. 994.—*Tetractinostigma* HASSK. *Hort. Bog.* ed. nov. 55; in *Bull. Soc. Bot. de Fr.* vi. 714.

<sup>1</sup> Spec. about 20.—ROXB. *Fl. Ind.* iii. 580 (*Abros*).—THW. *Enum. Pl. Zeyl.* 238.—WIGHT *Icon.* t. 361 (*Scepa*).—Miq. *Fl. Ind. Bat.* i. p. ii. 362; Suppl. 471 (*Tetractinostigma*).—HASSK. *Hort. Bog.* ed. nov. i. 59.—BENTH. *Pl. Hongk.*

316.—M. ARG. in *Linnaea*, xxxii. 78.—H. BN. in *Adansonia*, xi. 17.

<sup>2</sup> Ex H. BN. *Euphorb.* 642.—M. ARG. *Prodr.* 444.

<sup>3</sup> A genus very nearly allied to *Aporosa* (of which it would be better made a section), differing especially by its 1-locular germen (always?) i.e., in the same way as *Hemicyclia* from *Cyclostemon* & *Antidesma* from *Hieronyma*, also by its drupaceous and quite indehiscent fruit.

<sup>4</sup> Spec. 2, imperfectly known. H. BN. in *Adansonia*, ii. 55.



131. **Richeria** VAHL.<sup>1</sup>—Flowers diœcious apetalous; sepals 3–5, imbricate. Stamens same in number opposite inserted round rudimentary gynœceum; filaments finally long exerted and twisted; anthers oblong introrse (*Guarania*<sup>2</sup>), or extrorse (*Podocalyx*<sup>3</sup>), longitudinally rimose. Glands 5, alternating with stamens surrounding base of rudimentary gynœceum. Disk of female flowers usually urceolate. Germen 3-locular; ovules 2-nate; obturator usually thick; style branches 3, short, rather wide caniculate within, revolute at margin, at apex sub-2-lobed. Capsule 3-cocceous; cocci solute from columella 3-winged above; valves dehiscing from base; seeds albuminous.—Trees; leaves alternate simple penninerved, sometimes denticulate above petiolate 2-stipulate; male flowers<sup>4</sup> in axillary glomeruliferous spikes or racemes; female at base of branches spicate. (*South America, Antilles*.<sup>5</sup>)

132 ? **Dissiliaria** F. MUELL.<sup>6</sup> — Flowers diœcious (?); male  $\infty$ -androus (?). Female calyx 6–8-phyllous; folioles 2-seriate imbricated; the interior larger. Germen surrounded by cupular disk sometimes denticulate at base; cells 3, 4, opposite exterior sepals; ovules in each 2; obturator thick; style branches 3, entire or subentire recurved, inwardly stigmatiferous. Capsule 3–4-cocceous; exocarp thick soluble; cocci 1–2-spermous; seeds exarillate albuminous. Trees or shrubs; leaves opposite or more rarely 3-nate, entire or crenulate, penninerved reticulate; female flowers in terminal simple or cymiferous racemes.<sup>7</sup> (*Australia*.<sup>8</sup>)

133. **Hymenocardia** ENDL.<sup>9</sup>—Flowers diœcious apetalous (nearly of *Antidesma* or *Aporosa*); calyx 5- or more rarely 6–7-dentate, valvate or subimbricate. Stamens same in number inserted round base of entire rudiment of gynœceum; anthers ovoid introrse; cells longitudinally adnate, longitudinally rimose. Germen compressed, 2-locular; cells 2-ovulate; style branches 2, subfree elongated long

<sup>1</sup> *Eclog. Amer.* i. 30, t. 4.—A. JUSS. *Euphorb.* 16.—ENDL. *Gen.* n. 5861.—H. BN. *Euphorb.* 597.

<sup>2</sup> H. BN. *Euphorb.* 598.

<sup>3</sup> KL. in *Erichs. Arch.* (1841), vii. 202; in *Hook. Lond. Journ.* ii. 52.—H. BN. *Euphorb.* 597.

<sup>4</sup> Small crowded.

<sup>5</sup> Spec. 2, 3. W. Spec. iv. 1122.—ROEM. et SCH. *Syst.* v. 271.—POEPP. et ENDL. *Nov. Gen. et Spec.* iii. 22, t. 226 (*Amanoa*).—GRISEB. *Fl. Brit. W.-Ind.* 31.—H. BN. in *Adansonia*, v. 347

(*Guarania*); vi. 16.

<sup>6</sup> Ex H. BN. in *Adansonia*, vii. 356, t. 1.

<sup>7</sup> Cfr. *Choriceras* (p. 240, n. 124.)

<sup>8</sup> Spec. 2, 3. H. BN. *loc. cit.* 359.—BENTH. *Fl. Austral.* vi. 90.

<sup>9</sup> *Gen.* n. 1899.—TUL. in *Ann. Sc. Nat. sér.* 3, xv. 256.—H. BN. in *Bull. Soc. Bot. de Fr.* iv. 994; *Euphorb.* 599, t. 27, fig. 24, 25.—M. ARG. in *Flora* (1864), 518; *Prodr.* 476.—*Samaropyxis* MIQ. *Fl. Ind.-Bat. Suppl.* 464, 621.

papillose. Fruit samaroid; carpels 2, solute from axis (sometimes with difficulty) dehiscent compressed and dorsally produced superior to apex of style or shorter; seeds scantily albuminous; testa thin; cotyledons membranous, often lateral. (*Eust India, trop. W. Africa*.<sup>1</sup>)

134. **Baccaurea** LOUR.<sup>2</sup>—Flowers monœcious or diœcious (nearly of *Richeria* or *Securinega* apetalous; sepals 4, 5, imbricated, sometimes unequal. Disk 0 or rudimentary, sometimes more rarely evolute (*Adenocrepis*,<sup>3</sup> *Isandrion*<sup>4</sup>). Stamens inserted below rudiment of gynœceum either equal in number to sepals and opposite them (*Hedycarpus*,<sup>5</sup> *Calyptroon*<sup>6</sup>), or sometimes 4–10, 2-seriate, or 1-seriate, some in pairs before each sepal; filaments free; anthers introrse or more rarely extrorse (*Calyptroon*); cells longitudinally adnate and rimose. Germen (in male flower rudimentary lobed) surrounded by hypogynous disk more or less evolute or 0; cells 2 (*Isandrion*, *Adenocrepis*, *Calyptroon*), or 2, 3 (*Pierardia*<sup>7</sup>), sometimes 4, 5 (*Hedycarpus*); ovules in each cell 2; obturator usually thick; style generally short or very short (*Adenocrepis*) branches 2–5, rather wide, 2–3-lobed or unequally lacerate, inwardly at apex papillose. Fruit 1–5-locular indehiscent; pericarp pachydermous more or less fleshy; seeds albuminous more or less fleshy arillate.<sup>8</sup>—Trees or shrubs; leaves alternate petiolate 2-stipulate entire or denticulate penninerved; ribs and primary nerves prominent below; indumentum simple, stellate or 0; flowers in axillary simple or ramified racemes; bracts often more or less connate, with peduncle usually cymose few-flowered.<sup>9</sup> (*Trop. regions of Asia, Oceania and W. Africa*.<sup>10</sup>)

135. **Uapaca** H. BN.<sup>11</sup>—Flowers diœcious apetalous; calyx gamophyllous, 4–5-dentate or sepals 4, 5, imbricated. Stamens 4, 5; filaments free inserted below entire rudiment of gynœceum dilated at apex; anthers introrse, 2-rimose. Disk in

<sup>1</sup> Spec. 4, 5. H. BN. in *Adansonia*, i. 82.

<sup>2</sup> *Fl. Cochinch.* (ed. 1790), 661.—ENDL. *Gen. n.* 5888<sup>1</sup>.—M. ARG. *Prodr.* 456 (incl.: *Adenocrepis* BL. *Calyptroon* MIA. *Hedycarpus* MIA. (not JACK), *Microsepala* MIA. *Pierardia* BL.).

<sup>3</sup> BL. *Bijdr.* 579.—ENDL. n. 5873.—H. BN. *Euphorb.* 660.

<sup>4</sup> H. BN. in *Adansonia*, iv. 141.

<sup>5</sup> MIA. *Fl. Ind.-Bat.* i. p. ii. 359 (part.).

<sup>6</sup> MIA. *Fl. Ind.-Bat.* Suppl. i. 471.

<sup>7</sup> ROXB. *Fl. Ind.* ii. 254.—BL. *Bijdr.* 278.—ENDL. *Gen. n.* 5878.—H. BN. *Euphorb.* 557; in *Adansonia*, iv. 132.—*Pierardia* BL. *Bijdr.* 578.

<sup>8</sup> Concerning the aril, cf. *Adansonia*, iv. 133.

<sup>9</sup> Sect. 5 (M. ARG.): 1. *Hedycarpus* (MIA.); 2. *Pierardia* (ROXB.); 3. *Isandrion* (H. BN.); 4. *Adenocrepis* (BL.); 5. *Calyptroon* (MIA.).

<sup>10</sup> Spec. ad 35. WIGHT, *Icon.* t. 1912, 1913 (*Pierardia*).—MIA. *op. cit.* *Sumatr.* 459 (*Mappa*).—M. ARG. in *Linnaea*, xxxii. 82 (*Pierardia*); in *Flora* (1864), 469, 516 (*Pierardia*).—H. BN. in *Adansonia*, iv. 136, 137 not. (*Pierardia*).

<sup>11</sup> *Euphorb.* 595.—M. ARG. in *Linnaea*, xxxiv. 64; *Prodr.* 489.—*Gymnocarpus* DUP.—TH. MSS. (not FORSK.).—*Argythamnia* BERN. MSS. (nec AUCTT.)

female flower hypogynous cupular; germen 2-4-celled; ovules 2-nate; style branches 2, 4, petaloid-dilated multi-partite reflexed rigid persistent. Fruit more or less fleshy or suberous, usually pyramidal-3-coccous; seed exarillate; cotyledons of albuminous embryo wide curved, auriculate 5-plinerved at base; one convex, the other concave.—Trees; juice sometimes viscous resinous or cera-cous; twigs strong subangular nodose; leaves alternate collected at summit of twigs, petiolate simple penninerved glabrous coriaceous; male flowers crowded in short capitate pedunculate catkin<sup>1</sup>; bracts few wide petaloid<sup>2</sup> inserted at summit of peduncle, and the whole of the bud-shaped inflorescence at first involucrate; female axillary or supra-axillary solitary pedunculate. (*Trop. East. and West. Africa Cont. and Ins.*<sup>3</sup>)

136. **Bischoffia** BL.<sup>4</sup>—Flowers diœcious apetalous; male nearly of *Hymenocardia* (or *Securinea*); sepals 5, subimbricate or induplicate-subecullate. Stamens same in number opposite, inserted below rudiment of short gynœceum crenulate 5-lobed at apex; anthers adnate, laterally or extrorsely rimose. Female calyx 5-partite. Germen 3-4-locular, surrounded at base with 4, 5, or 0 staminodes; cells 2-ovulate; style branches entire recurved. Fruit subfleshy; endocarp pergamaceous, 3-coccous; seeds exarillate scantily albuminous.—Trees; leaves alternate petiolate pinnate-3-foliolate; folioles crenate-dentate penninerved petiolulate; flowers<sup>5</sup> in more or less ramified compound axillary racemes. (*Asia and warm Oceania.*<sup>6</sup>)

137. **Piranhea** H. BN.<sup>7</sup>—Flowers, it seems, diœcious; sepals 4-6, finally patent, imbricated. Stamens  $\infty$  (8-15); filaments free exerted, inserted on convex receptacle; glands intermixed nearly same in number unequally-capitate shortly stipitate; anthers introrse sub-2-dymous, longitudinally rimose. Female calyx 6-partite; folioles 2-seriate imbricated. Germen surrounded at base by 6 glands (staminodes?); cells 3, opposite exterior sepals; style branches 3, subulate

<sup>1</sup> Simulating a large flower.

<sup>2</sup> When dry red, sometimes very fragrant.

<sup>3</sup> Spec. ad 7. M. ARG. in *Flora* (1864), 617; in *Scem. Journ.* i. 332.—H. BN. in *Adansonia*, i. 81; ii. 43; xi. 176.

<sup>4</sup> *Bijdr.* 1168 (*Bischofia*).—H. BN. *Euphorb.* 594, t. 26, fig. 25-32.—M. ARG. *Prodr.* 478.—*Microelus* WIGHT et ARN. in *Edinb. New. Phil.*

*Journ.* xiv. 298.—*Stylodiscus* BENN. *Pl. Jav. Rav.* 133, t. 29.—ENDL. *Gen.* n. 5858<sup>1</sup>.

<sup>5</sup> Male very small crowded.

<sup>6</sup> Spec. 1, 2. ROXB. *Pl. Ind.* iii. 728 (*Andrachne*).—HOOK. *Icon.* t. 844.—WIGHT, *Icon.* t. 1880 (*Microelus*).—DCNE. in *Jacquem. Voy. Bot.* 152, t. 154.—WALP. *Ann.* i. 524.

<sup>7</sup> In *Adansonia*, vi. 235, t. 6.

inwardly stigmatiferous, and sulcate afterwards strictly reflexed to germen. Fruit...?—A tree(?); leaves<sup>1</sup> alternate petiolate, 2-stipulate digitate; folioles 3, subsessile penninerved, subentire or crenulate; male flowers in slender ramified spikes axillary or springing from the wood of the branches of the preceding year; branches of spikes filiform puberulate rather remotely glomeruliferous; the female in simple short few flowered rather thick spikes in the axils of the leaves of the preceding year; all bracteate and bracteolate. (*North Brazil*.<sup>2</sup>)

138 ? **Freireodendron** M. ARG.<sup>3</sup>—“Flowers diœcious apetalous; calyx 5-fid, imbricated. Stamens 10, the exterior opposite calyx lobes inserted under margin of central disk; the interior filaments as if perforating extrorsely projecting disk; anthers basifixed introrsely rimose. Germen 1-locular, 2-ovulate; stigma sessile wide subpeltate. Fruit drupaceous, by abortion 1-spermous; seed exarillate; cotyledons of copiously albuminous embryo 3-angular-ovate penninerved, cordate plane at base, longer than radicle.—A medium sized tree; leaves alternate slightly petiolate penninerved serrate-dentate; stipules deciduous; flowers axillary glomerate; female in glomerules as if radians.” (*Brazil*.<sup>4</sup>)

139. **Drypetes** VAHL.<sup>5</sup>—Flowers diœcious apetalous; calyx 4-6-partite imbricated. Stamens equal in number to petals (4-6) or twice more, oftener  $\infty$ ; filaments evolute, inserted round rudiment of germen<sup>6</sup> or wider disciform<sup>7</sup> (*Hemicyclia*,<sup>8</sup> *Cyclostemon*<sup>9</sup>) or free; anthers 2-locular; base of long adnate and introrse or laterally rimose cells always inferior. Germen surrounded by hypogynous usually cupular disk; cells 1 (*Hemicyclia*), or 1, 2 (*Cyclostemon*, *Stenogynium*<sup>10</sup>), or 3, 4 (*Dodecastemon*<sup>11</sup>), 2 ovulate; style branches short thick (*Eudrypetes*)

<sup>1</sup> Nearly of *Rutaceæ*, *Zanthoxylon*.

<sup>2</sup> Spec. 1. *P. trifoliolata* H. BN. loc. cit.

<sup>3</sup> *Prodr.* 244 (whence the characters have been selected by authors from representations).

<sup>4</sup> Spec. 1. *F. sessiliflorum* M. ARG.—*Drypetes sessiliflora* ALLEM. in *Bot. Zeit.* (1854), 469. A genus badly known.

<sup>5</sup> *Eclog. Amer.* iii. (1796), 49.—POIT. in *Mém. Mus.* i. 152, t. 6-8.—A. JUSS. *Euphorb.* 12.—ENDL. *Gen.* n. 5874.—H. BN. *Euphorb.* 606, t. 24, fig. 34-40; in *Adansonia*, xi. 98.—M. ARG. *Prodr.* 463 (incl.: *Anaua* MIQ. *Astylis* WIGHT, *Cyclostemon* BL. *Dodecastemon* HASSK. *Hemicyclia* WIGHT et ARN. *Liparene* POIT. *Periplexis* WALL. *Pycnosandra* BL. *Sphragidia* THW.)

<sup>6</sup> *Drypetes* AUCTT.

<sup>7</sup> “Discus intrastaminalis” (M. ARG.).

<sup>8</sup> WIGHT et ARN. in *Edinb. n. Phil. Journ.* xiv. 297.—ENDL. *Gen.* n. 5816.—H. BN. *Euphorb.* 562, t. 27, fig. 7, 8.—M. ARG. *Prodr.* 486.

<sup>9</sup> BL. *Bijdr.* 597.—ENDL. *Gen.* n. 5837.—H. BN. *Euphorb.* 561, t. 23, fig. 22-25.—M. ARG. in *Linnaea*, xxxii. 81; *Prodr.* 482.—*Sphragidia* THW. in *Hook. Journ.* (1855), 269, t. 10.—*Pycnosandra* BL. *Mus. Lugd.-Bat.* ii. 191. (fl. masc.).

<sup>10</sup> M. ARG. in *Linnaea*, xxxii. 81.

<sup>11</sup> HASSK. in *Bot. Zeit.* (1856), 803; in *Bull. Soc. Bot. de Fr.* vi. 716.—*Pycnosandra* BL. (fl. fem.).

or subpeltate dilated (*Stenogynium*), sometimes reniform-discoid (*Hemicyclia*), or more rarely filiform (*Dodecastemon*). Fruit globose, ovoid or rarely (*Astylis*<sup>1</sup>) angular, semifleshy, finally coriaceous or suberustaceous, indehiscent; endocarp of cells 1-5-osseous, coriaceous, or more rarely (*Astylis*) subchartaceous.<sup>2</sup> (*All trop. regions*.<sup>3</sup>)

140. **Putranjiva** WALL.<sup>4</sup>—Flores diœcious apetalous; male calyx 2-5-partite; leaves slightly or sometimes closely imbricated (*Palenga*<sup>5</sup>) or contorted. Stamens 2, 3, alternating with petals, equal in number to them; filaments central, free or 1-2-adelphous; anthers thick subglobose or ellipsoidal, extrorsely rimose. Female calyx 3-6-partite; germen 2-3-locular; ovules in cell 2-nate descendent; micropyle extrorse rather thick obturated; style afterwards divided into 2, 3, branches stigmatiferous at apex subreniform (*Palenga*) or wide obversely 3-angular-dilated. Fruit indehiscent subdrupaceous, finally dry, by abortion 1-locular; endocarp bony; embryo of solitary seed copiously albuminous; cotyledons subplane digitinerved at base.—Trees;<sup>6</sup> leaves alternate petiolate stipulate penninerved reticulate-venose; flowers<sup>7</sup> male axillary cymose or glomerate; female longer pedicellate solitary or few cymose. (*East India*.<sup>8</sup>)

141. **Longetia** H. BN.<sup>9</sup>—Flowers monœcious; sepals 6, 2-seriate imbricated; exterior shorter and thicker, sometimes dorsally subcarinate. Stamens  $\infty$ , or subdefinite (2-6); filaments inserted on rather convex<sup>10</sup> receptacle, central often flexuose or folded, and genuflexo-produced beyond anther; anthers extrorse; cells finally discrete above, rimose. Calyx of female flower nearly as in male; exterior

<sup>1</sup> WIGHT, *Icon. t.* 1992.—*Anava* MIO. *Fl. Ind.-Bat. Suppl.* 410.

<sup>2</sup> Sect. 6: 1. *Dodecastemon* (HASSK.); 2. *Cyclostemon* BL.; 3. *Stenogynium* (M. ARG.); 4. *Eudrypetes* (H. BN.); 5. *Astylis* (WIGHT); 6. *Hemicyclia* (WIGHT et ARN.).

<sup>3</sup> Spec. about 34. *Sw. Fl. Ind. Occ. i.* 329 (*Schæfferia*).—RICH. *Cuba*, 218.—THW. *Enum. Pl. Zeyl.* 286 (*Cyclostemon*), 287 (*Hemicyclia*).—GRISEB. in *Nachr. d. Kon. Ges. Un. Gatt.* (1865), 165; *Veg. d. Karaib.* 24; *Fl. Brit. W.-Ind.* 32.—MIO. *Fl. Ind. Bat. i. p. ii.* 360.—M. ARG. in *Flora* (1864), 517, 531 (*Cyclostemon*); in *Linnaea*, xxxii. 81.—BENTH. *Fl. Austral. vi.* 117 (*Hemicyclia*).—H. BN. in *Adansonia*, vi. 330 (*Hemicyclia*).

<sup>4</sup> *Tent. Fl. Nepal*, 61.—ENDL. *Gen. n.* 1894;

*Iconogr. t.* 19.—TUL. in *Ann. Sc. Nat.* sér. 3, xv. 252.—H. BN. in *Bull. Soc. Bot. de Fr.* iv. 991; *Euphorb.* 641.—SCHNIZL. *Iconogr. fasc.* 6.—M. ARG. *Prodr.* 443.—Pongolam RHEED. *Hort. Malab. vii. t.* 59.—*Nageia* ROXB. *Fl. Ind.* iii. 766 (nec GERTN.).

<sup>5</sup> THW. in *Hook. Journ.* (1856), 270, t. 7, fig. c.—H. BN. *Euphorb.* 649.

<sup>6</sup> Wood hard.

<sup>7</sup> Greenish or rather purple.

<sup>8</sup> Spec. 3 v. 4. WIGHT, *Icon. t.* 1876.—ROYLE, *III. Himal.* 347, t. 83 bis.—THW. *Enum. Pl. Zeyl.* 287.

<sup>9</sup> In *Adansonia*, ii. 228; vi. 352, t. 9; xi. 100.—M. ARG. *Prodr.* 244.

<sup>10</sup> Sometimes pilose at apex.

sepals decurrent at base beyond insertion. Germen sessile, surrounded at base by glands (staminodes ?) few or  $\infty$ , 3-locular; style branches 3, peripheric and discrete at base, inserted round vacant apex of germen, from the base or only at the apex, suddenly dilated into an ovoid-compressed mass inwardly and longitudinally sulcate stigmatiferous; ovules in cell 2-nate, sometimes as if with thick obturator very small. Capsule, sometimes outwardly suberose; cocci 3, 2-valved, 1-2-spermous; seeds smooth, arillate at micropyle; cotyledons of albuminous embryo<sup>1</sup> foliaceous elliptical, 5-plinerved at base.—Glabrous shrubs, often partly lavender-coloured leaves opposite entire coriaceous penninerved; flowers<sup>2</sup> at summit of twigs or in the axils of the upper branches composite-cymose, each cyme 1- or 2-sexual; female central; male peripheric. (*N. Caledonia*.<sup>3</sup>)

142. **Bureavia** II. Bx.<sup>4</sup>—Flowers diœcious apetalous (nearly of *Dissiliaria*); male sepals 4, inserted on shortly depressed conical receptacle, alternately imbricated. Stamens 8-12; filaments free erect; exterior aggregate inserted round glands in irregularly 4-6-agonal disk, and encircling more interior stamens 2 (or more rarely 3, 4); anthers extrorse, 2-rimose. Female flowers 3-4-merous; receptacle thick conical; sepals short rather thick at base, imbricated. Disk hypogynous annular submembranous unequally imbricated at apex. Germen thick sessile; cells 3, 4, oppositisepalous; style branches 3, 4, thick, fleshy, subelliptical, the middle inwardly sulcate, more or less patulous; ovules 2-nate and smaller by thick obturator. Fruit subdrupaceous, 3-4-coccous; exocarp coriaceous subfleshy soluble from endocarp; cocci solute from ligneous columella dilated at apex; seeds 1, 2, crowned with the filiform very densely comose lobes of aril<sup>5</sup> springing from the micropyle as well as from the hilum and persistent obturator; testa otherwise nitid;<sup>6</sup> cotyledons of copiously albuminous embryo<sup>7</sup> wide plane.—Small trees; leaves opposite p-tiolate exstipulate simple coriaceous penninerved; male flowers in crowded fasciculate composite-cymiferous racemes in axils of upper sometimes falling leaves; bracts and bractlets opposite; female axillary or springing from wood subsessile, solitary or glomerate few bracteate; fructiferous pedicels short thick. (*N. Caledonia*.<sup>8</sup>)

<sup>1</sup> Green.

<sup>2</sup> White, small crowded.

<sup>3</sup> Species 2, of which 1 is oligandrous.

<sup>4</sup> In *Adansonia*, xi, 83.

<sup>5</sup> Yellowish.

<sup>6</sup> Black or very dusky.

<sup>7</sup> Virescent.

<sup>8</sup> Spec. 2, H, Bx, *loc. cit.* 84; in *Adansonia*, ii, 215 (*Baloghia* ?).—M. ARG. *Prodr.* 1117, n. 2 (*Codiaeum* ?).

143. **Petalostigma** F. MUELL.<sup>1</sup>—Flowers diœcious or more rarely monœcious eglandular apetalous; sepals 4–6, imbricated. Stamens  $\infty$ , central; filaments inserted on conical receptacle at apex and between the stamens villose-hirsute, otherwise free short erect; anthers<sup>2</sup> extrorse penicillate at apex; cells long adnate and rimose. Germen sessile; cells 3, alternating with interior petals, or 4, 2-ovulate; obturator above micropyle extrorsely much evolute; style branches 3, 4, widely fleshy-subpetaloid, cuneate-obovate or lanceolate undulate-crispate. Capsules drupaceous; exocarp fleshy;<sup>3</sup> putamen bony, 3–4-coccous; cocci 2-valved, dorsally rather prominent carinate within; seed thick arillate at micropyle; cotyledons of copiously albuminous embryo foliaceous subelliptical.—A silky tomentellose small tree; leaves alternate petiolate; stipules 2, persistent; limb ovate or suborbiculate entire penninerved; male flowers in few flowered cymes shortly pedicellate; female solitary axillary; peduncle at apex few-bracteate. (*Australia*.<sup>4</sup>)

144. **Hyænanche** VAHL.<sup>5</sup>—Flowers diœcious apetalous; male receptacle varied in form, sometimes irregular, depressed, undulate or subpiculate. Sepals 5–12, imbricated, unequal; exterior usually smaller. Stamens 8– $\infty$ , inserted round empty centre of receptacle; filaments free; cells of oblong anthers longitudinally adnate, introrsely or extrorsely, more rarely all laterally rimose. Receptacle of female flowers conical; sepals 3–8, deciduous. Germen 3–4-locular; ovules 2-nate; style branches 3, 4, thick recurved dentate. Capsule 3–4-coccate, 6–8-sulcate; exocarp suberose solubile; endocarp ligneous; seeds in cocci 1, 2, arillate at micropyle; albumine scanty (coloured); cotyledons of straight embryo lateral foliaceous, cordate<sup>6</sup> at base much longer than superior radicle.—A small tree; branches suberose corticate; leaves opposite or 3–4-nate, shortly petiolate, entire coriaceous glabrous penninerved; flowers axillary;

<sup>1</sup> In *Hook. Journ.* (1857), 16.—H. BN. *Euphorb.* 657; in *Adansonia*, vii. 352, t. 2.—M. ARG. *Prodr.* 273.

<sup>2</sup> Sometimes sterile.

<sup>3</sup> Red, bitter.

<sup>4</sup> Spec. 1. *P. australium* H. BN. in *Adansonia*, vii. 356.—*P. quadriloculare* F. MUELL. loc. cit.—BENTH. *Fl. Austral.* vi. 92.—*P. triloculare* M. ARG. in *Flora* (1864), 471; *Prodr.* n. 2.

—? *Hylococcus sericeus* R. BR. in *Bauer. Icon. ined.* (ex BENTH.).

<sup>5</sup> In *Lamb. Descr. Cinchon. et Hyæn.* (1797), 52, t. 10.—A. JUSS. *Euphorb.* 40.—ENDL. *Gen.* n. 5876.—H. BN. *Euphorb.* 565, t. 23, fig. 29, 30.—M. ARG. *Prodr.* 479.—*Toxicodendron* THUNB. in *Act. Holm.* (1796), 190, t. 7 (not T., not GERTN.).

<sup>6</sup> Greenish or whitish.

male in densely composite-ramified racemes; female in a cushion shortly petiolate. (*South Africa*.<sup>1</sup>)

145 ? **Daphniphyllum** BL.<sup>2</sup>—Flowers dioecious apetalous; calyx 3-10-partite, imbricated; male deciduous. Stamens  $\infty$  (5-20); filaments free central, radiate ascendent from base (subumbellate); anthers usually compressed, sometimes 4-agonal; cells longitudinally adnate, sublaterally rimose. Germen sometimes surrounded by 4-6-glandular disk, 2-locular; ovules 2-nate descendent; micropyle extorse superior; obturator rather thick; style branches usually very short; disk-shaped-reniform, stigmatiferous at apex. Fruit more or less fleshy or subbaccate; endocarp sometimes chartaceous or fibrous; seeds 1, 2, exarillate; cotyledons of much shorter albuminous embryo narrow subplane or semicylindrical shorter than radicle.—Trees or shrubs; leaves alternate petiolate simple entire or dentate penninerved reticulate-veined; stipules small or inconspicuous; flowers axillary racemose; male pedicels articulate, deciduous.<sup>3</sup> (*Asia and N. warm Oceania, trop. W. Africa*.<sup>4</sup>)

146. **Phyllanthus** L.<sup>5</sup>—Flowers monoecious apetalous; sepals usually 5, 6, more rarely 4 (*Cicca*,<sup>6</sup> *Epistylum*,<sup>7</sup> *Eriococcus*,<sup>8</sup> *Scepasma*<sup>9</sup>), or 7-9, free or more or less high connate, 2-3-seriate imbricate.

<sup>1</sup> Spec. 1. *H. globosa* VAILL et LAMR. loc. cit.—H. BN. in *Adansonia*, iii. 163.—CROTON BURM. *Afr.* 122, t. 45.—*Jatropha globosa* GERTN. *Fruct.* ii. 122, t. 109, fig. 3.—*Toxicodendron capense* THUNB. loc. cit.

<sup>2</sup> *Bijdr.* 1153.—ENDL. *Gen.* n. 5755.—H. BN. *Euphorb.* 564, t. 21, fig. 25-27.—M. ARG. in *DC. Prodr.* xvi. sect. i. 1.—*Goughia* WIGHT, *Icon.* t. 1877, 1878.—*Gyandra* WALL. *Cat.* n. 8020 (nec GEIS.).

<sup>3</sup> A genus distinct from *Euphorbiaceæ* on account of short embryo and other characters, with some constituting a separate order (*Daphniphyllaceæ* M. ARG.), formerly doubtfully reduced to *Rhamnaceæ* (BL.).

<sup>4</sup> Spec. 12, 13. BENTH. *Fl. Hongk.* 316.—M. ARG. in *Linnaea*, xxxiv. 76; in *Flora* (1864), 536.—KURZ, in *Teyssm. Pl. Nov. Hort. Bog.* 37.—MIA. in *Ann. Mus. Lugd.-Bat.* iii. 129.

<sup>5</sup> *Gen.* n. 1050.—J. *Gen.* 386.—LAMR. *Ill.* t. 756, 757.—POIR. *Diet.* v. 295; *Suppl.* iv. 401.—SW. *Fl. Ind. Occ.* ii. 1101.—A. JUSS. *Euphorb.* 21, t. 5, fig. 16.—ENDL. *Gen.* n. 5847.—H. BN. *Euphorb.* 621, t. 22, fig. 15-36; 23, fig. 1-21; 24, fig. 1-9, 15-33; 25, fig. 10-15, 22-24; 27, fig. 5, 6, 9-17.—M. ARG. *Prodr.* 274 (incl.:

*Agyneia* L. (not VENT.), *Anisonema* A. JUSS. *Ardinghelia* COMMERS. *Asterandra* KL. *Bradleya* GERTN. *Bryonia* FORST. (part.), *Calacoccus* KURZ, *Chorisandra* WIGHT, *Cicca* L. *Dichalcotina* HANCE, *Diasperus* L. *Emblia* GERTN. *Epistylum* SW. *Eriococcus* HASSK. *Genesiphylla* LHER. *Glochidion* FORST. *Glochidionopsis* BL. *Glochisandra* WIGHT, *Gynoon* A. JUSS. *Hemicicca* H. BN. *Margaritaria* L. (part.), *Meborea* AUBL. *Mouarda* COMMERS. *Nymphanthus* LOUR. *Orbicularia* H. BN. *Peltandra* WIGHT, *Pleistemon* SOND. *Procorus* DALZ. *Reidia* WIGHT, *Rhopium* SCHREB. *Scepasma* BL. *Staurothylax* GRIEF. *Synostemon* F. MUELL. *Tricaryum* LOUR. *Williamia* H. BN. *Wurtzia* H. BN. *Xylophylla* L. *Zygosperrum* THW. BAKER, *Fl. Maurit.* 308).

<sup>6</sup> L. *Mantiss.* i. 17.—J. *Gen.* 386.—LAMR. *Ill.* t. 757.—A. JUSS. *Euphorb.* 20, t. 4.—JACA. *Hort. Schænbr.* t. 294.—ENDL. *Gen.* n. 5851.—H. BN. *Euphorb.* 617, t. 24, fig. 28-33.

<sup>7</sup> SW. *Fl. Ind. Occ.* 1095, t. 22.—A. JUSS. *Euphorb.* 17, t. 3, fig. 8.—ENDL. *Gen.* n. 5858.—H. BN. *Euphorb.* 646.

<sup>8</sup> HASSK. *Cat. Hort. Bog.* 242.

<sup>9</sup> BL. *Bijdr.* 582.—H. BN. *Euphorb.* 648, t. 25, fig. 10-15.



Stamens generally 3, more rarely 5, or 2, 4, 6, very rarely 7-15-20 (*Asterandra*,<sup>1</sup> *Pleiosomon*,<sup>2</sup> *Oxalystylis*,<sup>3</sup> *Orbicularia*,<sup>4</sup> *Williamia*,<sup>5</sup> *Chorisanthra*<sup>6</sup>), central, inserted on rather convex receptacle; filaments free or more or less high 1-adelphous, equal or unequal (*Kirganelia*<sup>7</sup>); anthers 2-locular extrorse, longitudinally or horizontally rimose, much varied in form, mucicous or apiculate. Glands of disk equal in number to and alternating with the sepals free or unequally or equally 1-adelphous, in female flower sometimes connate in urceolate disk, sometimes 0 (*Glochidion*<sup>8</sup>). Germen sessile; cells usually 3, more rarely 2 or 4, very rarely 5-15; style branches equal in number to cells, entire or oftener 2-lobulate or 2-fid stigmatiferous at apex. Ovules in each cell 2, collateral, or descendent, more or less completely anatropous or peritropous, or more rarely suborthotropous subadscendent; micropyle extrorse superior. Fruit capsular; exocarp sometimes subfleshy or fleshy often soluble; cocci (usually 3) 2-valved, 1, 2-spermous. Seeds smooth verrucose or costulate; external coat thin or more or less fleshy (arillate); outer coat more or less thick, often crustaceous; hilum subbasilar (in seeds suborthotropous) or more or less high impressed, at internal angle small or more or less depressed subregular, or more rarely very unequal, irregular and concave; micropyle not carunculate; cotyledons of straight or arched copiously albuminous embryo rather wide complanate.—Trees or oftener shrubs, undershrubs or herbs; habit much varied; branches usually alternate, sometimes 2-morphous; twigs sometimes cladodiform subaphyllous (*Xylophylla*<sup>9</sup>), oftener when leaves are evolved, simulating a compound pinnate leaf and frequently (like the leaf) articulate at base, and finally solute from branch; leaves alternate or rarely opposite, often 2-stichous, sometimes reduced to squamules, shortly petiolate or sessile, 2-stipulate, penninerved, often unequal at base; flowers (small, often white or purplish-virescent) in axils of leaves or sometimes bracts, solitary or

<sup>1</sup> KL. in *Erichs. Arch.* vii. 200.—H. BN. *Euphorb.* 610, t. 27, fig. 5, 6.

<sup>2</sup> SOND. in *Linnaea*, xxiii. 135.

<sup>3</sup> H. BN. *Euphorb.* 628, t. 24, fig. 15-19.

<sup>4</sup> H. BN. *Euphorb.* 616.

<sup>5</sup> H. BN. *Euphorb.* 559, t. 27, fig. 9, 10.

<sup>6</sup> WIGHT, *Icon.* t. 1994.

<sup>7</sup> A. JUSS. *Euphorb.* 21, t. 4, fig. 14.—H. BN. *Euphorb.* 612, t. 23, fig. 18-21; 24, fig. 25-27.

<sup>8</sup> FORST. *Char. Gen.* 113.—A. JUSS. *Euphorb.* 18, t. 3.—ENDL. *Gen. n.* 5857.—H. BN. *Euphorb.* 636, t. 24, fig. 1-9; 27, fig. 12-15.

<sup>9</sup> L. *Gen.* 511.—SW. *Obs.* 114, t. 10.—GERTN. *Fruct.* t. 108.—A. JUSS. *Euphorb.* 23, t. 5, fig. 17.—ENDL. *Gen. n.* 5847 a.—H. BN. *Euphorb.* 623.—M. ARG. *Prodr.* 427.—*Genesiphylla* LHER. *Sert.* 29, t. 39.

much often cymose glomerate; cymes 1- or 2-sexual; female flowers usually central, thicker and longer pedicellate.<sup>1</sup> (*All warm regions.*<sup>2</sup>)

147. **Breynia** FORST.<sup>3</sup>—Flowers (nearly of *Phyllanthus*); stamens 3, 1-adelphous. Male calyx obconical or turbinate, 2-seriate infracto-6-lobed; lobes dorsally plicate-appendiculate infracto-connivent. Female flower turbinate (of *Phyllanthus*), and fruit sometimes more or less stipitate in calyx (*Breyniastrum*<sup>4</sup>); seeds arillate (*Melanthe-*

<sup>1</sup> Sect. 44 (ex M. ARG. *Prodr.* 275), scil.: 1. *Euglochidion*.—2. *Hemiglochidion*.—3. *Glochidiopsis*.—4. *Pentaglochidion*.—5. *Eleuther-gonium* (*Chorizogonium*).—6. *Scleroglochidion*.—7. *Physo-glochidion* (*Phytocalyx* H. BN.).—8. *Adenoglochidion*.—9. *Heteroglochidion*.—10. *Gomphidium* (H. BN.).—11. *Microglochidion*.—12. *Hemiphyllanthus*.—13. *Hemicicca* (H. BN. *Euphorb.* 645).—14. *Embleicstrum*.—15. *Synostemon* (F. MUELL. *Fragm.* i. 32).—16. *Williamia* (H. BN. *Euphorb.* 559, t. 27, fig. 9, 10;—M. ARG. in *Linnaea*, xxxii. 2; *Williamiandra* GRISEB. in *Nachr. d. Koen. Ges. d. Wiss. Gœtt.* (1865), 171).—17. *Asterandra* (KL. in *Erichs. Arch.* vii. 200; H. BN. *Euphorb.* 610, t. 27, fig. 5, 6; *Amphiandra* GRISEB. *Fl. Brit. W.-Ind.* 34).—18. *Oxalistylis* (H. BN. *Euphorb.* 628, t. 24, fig. 15-19; M. ARG. in *Linnaea*, xxxii. 2).—19. *Orbicularia* (H. BN. *Euphorb.* 616; GRISEB. *Fl. Brit. W.-Ind.* 34; M. ARG. in *Linnaea*, xxxii. 2).—20. *Pleio-stemon* (SOND. in *Linnaea*, xxxiii. 135; H. BN. *Euphorb.* 615; M. ARG. *loc. cit.*).—21. *Chorisandra* (WIGHT, *Icon.* t. 1994).—22. *Ciccopeltandra* (M. ARG. *loc. cit.*).—23. *Menarda* (A. JUSS. *Euphorb.* 23, t. 6, fig. 18; ENDL. *Gen.* n. 5846; H. BN. *Euphorb.* 608; M. ARG. *Prodr.* 334).—24. *Peltandra* (WIGHT, *Icon.* t. 1891, 1892).—25. *Kir-ganelia* (A. JUSS. *Euphorb.* 21, t. 4, fig. 14; ENDL. *Gen.* n. 5849; H. BN. *Euphorb.* 612, t. 23, fig. 18-21; M. ARG. in *Linnaea*, xxxii. *Prodr.* 341; *Ardingthelia* COMMERS. MSS. (ex A. JUSS. *loc. cit.* 19, t. 4, fig. 11).—26. *Flugeopsis* (M. ARG. in *Linnaea*, xxxii. 2).—27. *Pseudomenaraa* (M. ARG. in *Scem. Journ. Bot.* (1864), 329).—28. *Ceramanthus* (HASSK. *Cat. Hort. Bog.* 240; H. BN. *Euphorb.* 629, t. 25, fig. 22-24; M. ARG. in *Linnaea*, xxxii. 3).—29. *Cathetus* (LOUR. *Fl. Cochinch.* (ed 1790), 607; *Cluytiopsis* M. ARG. in *Linnaea*, xxxii. 3).—30. *Anisobolium* (M. ARG. in *Scem. Journ. Bot.* (1864), 330).—31. *Paragomphidium* (M. ARG. in *Linnaea*, xxxii. 3; *Gomphidium* H. BN. in *Adansonia*, ii, 234).—32. *Emblée* GERTN. *Fruct.* ii. 122, t. 1089; A. JUSS. *Euphorb.* 20, t. 5, fig. 15; ENDL. *Gen.* n. 5850; H. BN. *Euphorb.* 626; *Dichæactina* HANCE, *Pl. Chin. Austr.* i. p. 2).—33. *Para-*

*phyllanthus* (M. ARG. in *Linnaea*, xxxii. 3).—34.—*Meborea* (AUBL. *Guian.* ii. 825, t. 323; *Rhopium* SCHREB. *Gen.* n. 1382; *Euphyllanthus* GRISEB. *Fl. Brit. W.-Ind.* 33; M. ARG. in *Linnaea*, xxxiii. 3; *Prodr.* 374).—35. *Epistylum* (SW. *Fl. Ind. Occ.* 1095, t. 22; A. JUSS. *Euphorb.* 17, t. 3, fig. 8; ENDL. *Gen.* n. 5858; H. BN. *Euphorb.* 647 (sect. *Eupistylum*); GRISEB. *Fl. Brit. W.-Ind.* 33; M. ARG. *Prodr.* 412; *Omphalea* (part.) SW. *Prodr.* 95).—36. *Catastylum* (GRISEB. *Fl. Brit. W.-Ind.* 33).—37. *Cicca* (L. *Mantiss.* i. 17; J. *Gen.* 386; LAMK. *Diet.* ii. 1; *Ill.* t. 757; A. JUSS. *Euphorb.* 20, t. 4, fig. 13; H. BN. *Euphorb.* 617, t. 24, fig. 28-33; M. ARG. *Prodr.* 413; *Breynia* (part.) FORST. *Char. Gen.* t. 73, fig. K; *Tricaryum* LOUR. *Fl. Cochinch.* (ed 1790), 557; *Margaritaria* (part.) L. f. *Suppl.* 66 (fœm.); *Wurtzia* H. BN. in *Adansonia*, i. 186, t. 7, fig. 5, 6; *Staurorhynchus* GRIFF. *Notul.* iv. 476; *Prosorus* DALZ. in *Hook. Journ.* (1852), 345; *Zygosperrum* THW. (ex H. BN. *Euphorb.* 620, t. 27, fig. 11; *Ciccoides* H. BN. *Euphorb.* 618).—38. *Hedycarpidium* (*Calococcus* KURZ, in *Teyss. et Binn. Pl. Nov. v. Min. Cogn. Hort. Bot.* 34; M. ARG. *Prodr.* 418; *Hedycarpus* (part.) MIQ. *Fl. Ind.-Bat.* i. p. ii. 359).—39. *Nymphanthus* (LOUR. *Fl. Cochinch.* (ed 1790), 644).—40. *Eriococcoides* (M. ARG. in *Linnaea*, xxxii. 3; *Prodr.* 419).—41. *Eriococcus* (HASSK. *Cat. Hort. Bog.* 242; M. ARG. in *Linnaea*, xxxii. 3; *Prodr.* 420; *Epistylum* (sect. *Eriococcus*) H. BN. *Euphorb.* 648; *Reidia* WIGHT, *Icon.* t. 1903, 1904).—42. *Scapasina* (BL. *Bijdr.* 582; H. BN. *Euphorb.* 648, t. 25, fig. 10-15).—43. *Choretropsis* (M. ARG. in *Linnaea*, xxxii. 4; *Prodr.* 427).—44. *Xylophylla* (L.).

<sup>2</sup> Spec. ad 425. M. ARG. *Prodr.* 278-434, 1270.—BENTH. *Fl. Austral.* vi. 93.—II. BN. in *Adansonia*, i. 24, 82 (*Kirganelia*), 85 (*Cicca*), 86; ii. 13, 47 (*Kirganelia*), 51 (*Cicca*), 52, 231; iii. 165; v. 351; vi. 338.

<sup>3</sup> *Char. Gen.* 146, t. 73, fig. a-e.—M. ARG. *Prodr.* 438.

<sup>4</sup> H. BN. in *Adansonia*, vi. 344. Germen unequal-6-tuberculate at apex.

*sopsis*<sup>1</sup>) or exarillate (*Melanthesa*<sup>2</sup>).—Shrubs or small trees; alternate leaves<sup>3</sup> and inflorescence of *Phyllanthus*. (*Asia and trop. Oceania*.<sup>4</sup>)

148. **Sauropus** BL.<sup>5</sup>—Flowers (nearly of *Breynia* and *Phyllanthus*) monœcious; glands extrastaminal opposite sepals. Male calyx depressed-turbinate; disk adnate introrsely 6-lobed free. Fruit and other characters of *Phyllanthus*; seeds exarillate.—Shrubs or undershrubs; leaves and inflorescence of *Breynia* (or *Phyllanthus*); flowers axillary very shortly racemulose; rachis of racemules generally densely imbricate bracteolate. (*Asia and trop. Oceania*.<sup>6</sup>)

149. **Agyneia** VENT.<sup>7</sup>—Flowers monœcious (nearly of *Sauropus* or *Phyllanthus*); male calyx 6-partite. Extrastaminal glands of adnate extrorsely 6-lobed lobate male disk opposite sepals. Germen (of *Phyllanthus*) usually depressed at apex. Fruit and other characters of *Phyllanthus*; seeds exarillate.—Herbs annual or suffrutescent at base; habit and leaves of *Phyllanthus*;<sup>8</sup> branches procumbent or ascendent compressed-angular or 3, 4-agonal; flowers axillary cymulose sometimes, from the leaves being scarcely developed in slender racemose-cymose branches; cymes in axils of bracts 1- or 2-sexual; female flowers usually few or 1, central; others smaller, more slender pedicellate male. (*Trop. Asia and Oceania, South East. Cont. and Ins. Africa*.<sup>9</sup>)

<sup>1</sup> M. ARG. in *Linnaea*. xxxii. 74; *Prodr.* 436.

<sup>2</sup> BL. *Bijdr.* 590.—ENDL. *Gen.* n. 5848.—H. BN. *Euphorb.* 634.

<sup>3</sup> Dry, usually nigrescent.

<sup>4</sup> Spec. about 15. POIR. *Diet.* v. 296 (*Phyllanthus*).—KURZ, in *Teyssm. et Binn. Pl. Nov. Hort. Bog.* 35 (*Melanthesa*).—BENTH. *Fl. Hongk.* 312 (*Melanthesa*); *Fl. Austral.* vi. 113.—THW. *Enum. Pl. Zeyl.* 285 (*Melanthesa*).—H. BN. in *Adansonia*, *loc. cit.* 345.

<sup>5</sup> *Bijdr.* 595.—ENDL. *Gen.* n. 5842.—H. BN. *Euphorb.* 634, t. 27, fig. 19-22.—M. ARG. *Prodr.* 239, 1269.—*Ceratogynum* WIGHT, *Icon.* t. 1900.

<sup>6</sup> Spec. ad 12. W. *Spec.* iv. 585 (*Phyllanthus*).—THW. *Enum. Pl. Zeyl.* 284.—WIGHT, *Icon.* t.

1951, 1952.—HASSK. *Pl. Jav. Rar.* 268.—Miq. *Fl. Ind.-Bat.* i. p. ii. 366, 367 (*Agyneia*).

<sup>7</sup> *Jard. de Cels*, 23, t. 23.—A. JUSS. *Euphorb.* 24, t. 6, fig. 19.—ENDL. *Gen.* n. 5843.—H. BN. *Euphorb.* 630, t. 24, fig. 10-14.—M. ARG. *Prodr.* 237.—BAKER, *Fl. Mawit.* 312.—*Diplomorpha* GRIFF. *Notul.* iv. 479.

<sup>8</sup> Of which it is much better made a section.

<sup>9</sup> Spec. 2. L. *Syst.* ed. 13, 707; *Suppl.* 415 (*Phyllanthus*).—SPRENG. *Syst.* iii. 20 (*Emblia*).—W. *Spec.* iv. 568 (part.).—BL. *Bijdr.* 594.—WIGHT, *Icon.* t. 1893.—Miq. *Fl. Ind.-Bat.* i. p. ii. 367.—THW. *Enum. Pl. Zeyl.* 283.—KURZ, in *Teyssm. et Binn. Pl. Nov. Hort. Bog.* 84.—H. BN. in *Adansonia*, ii. 54.

## VIII. CALLITRICHEÆ.

150. **Callitriche** L.—Flowers monœcious or more rarely polygamous; sepals (?) 2, lateral. Stamens 1, or 2, alternisepalous; filaments elongate; clefts of 2-locular reniform anthers lateral, finally confluent above. Germen sessile or shortly stipitate; cells 2, oppositisepalous; style branches 2, elongate subulate-filiform, stigmatiferous on all sides; ovules in each cell 2, collaterally descendent; micropyle extrorse superior; obturator often minute; a spurious septum possibly springs from back of cells and intrudes between the ovules. Fruit hence 4-lobed, 4-locellate; lobes dry, dorsally marginate or winged, finally solute; cells 1-spermous; seed descendent; testa membranous; albumen fleshy; cotyledons of straight or curved axile terete embryo equal to radicle.—Annual subglabrous herbs usually aquatic very slender; leaves opposite linear or obovate entire 3-nerved flowers axillary solitary or few; bractlets membranous. (*All warm and temp. regions.*) See p. 151.

## XLII. TEREBINTHACEÆ.

### 1. SPONDIAS SERIES.

*Pistachia terebinthus* (Fr. Térébinthe), from which this family derives its name, belongs to the genus *Pistacia* (fig. 259, 314–317); but this is far from being the most complete type known, that being only found in the *Spondias*<sup>1</sup> (fig. 260, 261), and some closely allied genera. The flowers are regular, hermaphrodite or polygamous, with four or, more often, five parts. In the latter the convex receptacle bears from below upwards: a calyx with five divisions, more or less deep, imbricate in the bud; five alternate petals, valvate or slightly imbricate on the feather-like edges, and ten stamens superposed, five to the divisions of the calyx and five to the petals. They are each formed of a free filament, inserted outside the base of a large five-lobed disk, and a bilocular introrse anther dehiscant by two longitudinal slits. Inside the disk is found a gynæceum with five oppositipetalous carpels; they are united, sometimes, it is true, to a very slight extent, in their ovary; whilst the style is free, marked in the interior by a mesial groove, longitudinal, and more or

*Pistacia vera.*



Fig. 259. Female Floriferous branch.

<sup>1</sup> *Spondias* L. *Gen.* n. 377.—J. *Gen.* 272.—GERTN. *Fruct.* ii. t. 103, 104.—LAMK. *Diet.* iv. 259; Suppl. iii. 725; *Ill.* t. 384.—K. in *Ann. S. Nat.* sér. 1. ii. 363.—DC. *Prodr.* ii. 75.—TURP. in *Diet. Sc. Nat. Atl.* t. 263.—ENDL. *Gen.* n. 5920.—B. H. *Gen.* 426, 1601, n. 36.—

H. BN. in *Payer Fam. Nat.* 408.—MARCH. *Anacard.* 21, 158.—PLUM. *Gen.* 44. t. 22.—BAKER, *Fl. Maurit.* 62.—ADANS. *Fam. des Pl.* ii. 841 (incl.: *Cytheraea* DC. *Evia* COMMERS. *Lanneoma* DEL. *Poupartia* COMMERS. *Shakua* BOJ.) *Wirtgenia* JUNGH.),

less dilated at its stigmatiferous apex. In the interior angle of each ovary cavity is a placenta supporting two descendent ovules, one being often abortive, the micropyle originally directed upwards and outwards.<sup>1</sup> The fruit is a drupe whose three, four, or five parts are completely joined together or independent in the upper

*Spondias lutea*.



Fig. 260. Flower ( $\frac{1}{2}$ ).



Fig. 261. Longitudinal section of flower.

part. The stone, with thick stony monospermous cells, vertical or divergent, smooth outwardly, or sometimes prickly with exterior prominencies, and hollowed out above by oblique channels, is covered by a more or less abundant mesocarp. The seeds enclose, under their thin coats, a fleshy exalbuminous embryo, with thick, plano-convex cotyledons and a short superior radicle.

In certain species of *Spondia*, as *S. plciogyna*,<sup>2</sup> the number of ovary cells may amount to fifteen. In others, there are generally only two or three; this is the case in *Poupartia*,<sup>3</sup> consisting of plants from eastern tropical Africa, principally insular, often considered as a distinct genus, the prefloration of whose corolla is generally much more distinctly imbricate. Ten species<sup>4</sup> of *Spondias* are known growing in all the tropical regions of the globe, and several are frequently cultivated in warm countries. These are trees, with alternate leaves, near together towards the summit of the branches, compound-imparipinnate, with opposite folioles. Their

<sup>1</sup> With double coat.

<sup>2</sup> F. MUELL. *Fragm.* iv. 78.

<sup>3</sup> COMMERS. ex J. Gen. 372.—POIR. *Dict.* v. 606.—K. in *Ann. Sc. Nat.* sér. 1, ii. 364.—DC. *Prodr.* ii. 75.—ENDL. *Gen.* n. 5921.—MARCH. *Anacard.* 27, 159.—*Lanneoma* DEL. in *Ann. Sc. Nat.* sér. 2, xx. 91, t. 1, fig. 2.—WALP. *Rep.* v. 413; *Ann.* iii. 483.—B. H. *Gen.* 428. n. 42.—

*Shakua* BOJ. *Hort. Maur.* 82.

<sup>4</sup> WIGHT et ARN. *Prodr.* i. 172, 173 (*Cythærea*).—GUILLEM. in *Ann. Sc. Nat.* sér. 2, vii. 362.—BL. *Mus. Lugd.-Bat.* 233, t. 41 (*Evia*).—OLIV. *Fl. Trop. Afr.* i. 447.—BENTH. *Fl. Austral.* i. 491.—WALP. *Rep.* i. 556; v. 418; *Ann.* ii. 287; vi. 648.

flowers, small and numerous, are collected at the summits of the branches in clusters generally much ramified and composed of small cymes.

The carpels become quite free in *Buchanania*<sup>1</sup> (fig. 262–264), consisting of trees from tropical Asia and Oceania, organized almost the same as the *Spondias*; but only one of these carpels has a fertile ovule, suspended at the summit of a funicle which rises from the base of the cell. The micropyle is directed upwards and inwards. In other respects, the flowers are regular with a short calyx, whose five divisions early cease to touch each other, five imbricate petals, and ten stamens arranged on two verticels round

*Buchanania angustifolia*.

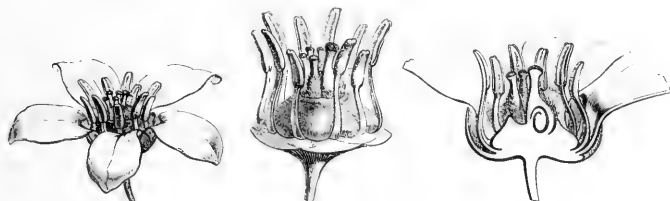


Fig. 262. Flower without the corolla ( $\frac{1}{2}$ ).

Fig. 264. Flower without the perianth.

Fig. 263. Longitudinal section of flower.

a thick disk. The fruit is a monospermous drupe. *Buchanania*, of which twenty species have been described,<sup>2</sup> consists of trees with alternate, simple, entire, coriaceous leaves. The flowers, small and numerous, are arranged in axillary and terminal clusters, more or less ramified, and composed of cymes or glomerules.

*Sclerocarya*,<sup>3</sup> also closely allied to the *Spondias*, principally to *Poupartia*, has polygamous flowers with imbricated calyx and corolla, usually pentamerous, and from eight to fifteen stamens in the male flower, whilst the hermaphrodite flower has fewer (partly sterile). But the gynæceum differs from that of the *Spondias* (with which it was

<sup>1</sup> ROXB. *Pl. Coromand.* iii. 79, t. 282; *Fl. Ind.* ii. 385.—DC. *Prodr.* ii. 63.—ENDL. *Gen.* n. 5919.—B. H. *Gen.* 421, n. 11.—MARCH. *Anacard.* 118, 193.—*Contogiton* BL. *Bijdr.* 1156.—*Cambessedea* K. in *Ann. Sc. Nat. sér. 1*, ii. 386 (nec DC. nec WIGHT et ARN.).—*Launzan* BUCHAN. in *Asiat. Res.* v. 123.

<sup>2</sup> WIGHT et ARN. *Prodr.* i. 169.—DELESS.  *Ic.*

*Scl.* iii. t. 54.—WIGHT, *Icon.* t. 81, 101, 237.—MIQ. *Fl. Ind.-Bat.* ii. p. ii. 636; Suppl. i. 523.—WALP. *Rep.* i. 556; v. 416; *Ann.* ii. 286; iv. 447; vii. 645.

<sup>3</sup> HOCHST. in *Flora*, xxvii. (1844), Bes. Beil. 1.—B. H. *Gen.* 427, n. 40.—MARCH. *Anacard.* 30, 161.—BAKER, *Fl. Mauriti.* 62.

formerly confounded) in having an ovary with two or three cells, surmounted by an equal number of distant styles, swollen at the summit into a stigmatiferous head. The ovary cells each enclose an ovule, directed like that of *Spondias*; and the fruit is a drupe with thick stone whose two or three cells each contain an exalbuminous seed. The two or three<sup>1</sup> known species of *Sclerocarya* inhabit the warm regions of tropical and southern Africa, and have the flowers arranged in unramified spikes, on the axis of which are arranged in gradation small bi- or tri-florous glomerules.

## II. BURSERA SERIES.

The most complete known type of the *Bursera* series (Fr. Gom-mart)<sup>2</sup> is a plant of the Mascarene Islands, named by several authors *B. obtusifolia*<sup>3</sup>. Its flowers (fig. 265-268) are regular and

*Bursera (Marignia) obtusifolia*.



Fig. 265. Hermaphrodite flower ( $\frac{1}{2}$ ).



Fig. 266. Diagram.



Fig. 268. Longitudinal section of flower.



Fig. 267. Flower, the perianth removed.

polygamous. In those which are hermaphrodite we find a gamosepalous calyx, having generally five divisions whose prefloration is valvate or slightly imbricate. The petals are the same in number, valvate in the bud. The androecium is formed of two verticels of

<sup>1</sup> GUILLEM., A. RICH. et PERR. *Fl. Seneg. Tent.* i. 152, t. 41 (*Spondias*).—SOND. in *Linnaea*, xxiii. 26 (*Sclerocarpa*).—HARV. et SOND. *Fl. Cap.* i. 524.—OLIV. *Fl. trop. Afr.* i. 449.—WALP. *Rep.* v. 418; *Ann.* ii. 287; vii. 648.

<sup>2</sup> L. *Gen.* n. 440.—J. *Gen.* 372.—LANK. *Dict.* ii. 767; Suppl. ii. 812; *Ill.* t. 256.—JACQ. *Stirp. Amar.* 94, t. 65.—K. in *Ann. Sc. Nat.* sér. 1, ii.

350.—DC. *Prodr.* ii. 77.—TURP. in *Dict. Sc. Nat.* Atl. t. 264, 265.—SPACH, *Suit à Buffon*, ii. 239.—ENDL. *Gen.* n. 5933.—B. H. *Gen.* 324, n. 6.—BAKER, *Fl. Maurit.* 43.—MARCH. in *Adansonia*, viii. 28, 64 (incl.: *Dammara* GÆRTN. *Elaphrium* JACQ. *Leica* AUBL. *Marignia* COMMERS. *Protium* BURM.).

<sup>3</sup> LANK. *Dict.* ii. 768, n. 3.



five stamens, those which correspond to the intervals of the petals being slightly longer. All have a free filament inserted below an hypogynous annular disk, dilated at the base and tapering at the top, supporting a bilocular, introrse anther, dehiscing by two longitudinal clefts. The gynæceum, rudimentary in the male flowers, is

*Bursera (Eubursera) gummifera.*



Fig. 269. Male flower (♂).



Fig. 270. Longitudinal section of male flower.



Fig. 271. Hermaphrodite flower (♀).



Fig. 273. Longitudinal section of hermaphrodite flower.



Fig. 272. Diagram of hermaphrodite flower.



Fig. 274. Hermaphrodite flower without the perianth.

composed of a free ovary tapering upwards in a style whose stigmatiferous apex is dilated and divided into five lobes, superposed like the cells (fig. 266), to the petals. In the internal angle of each cell, the placenta supports two collateral, descendent, anatropous ovules, with micropyle directed upwards and outwards (fig. 268). The fruit, accompanied at its base by a more or less persistent calyx, is a drupe whose stones, one to six in number, each enclose a descendent seed. The ex-albuminous embryo has thick fleshy cotyledons, several times folded together, and a short superior radicle. *B. obtusifolia*, chosen as the type of the genus *Marignia*,<sup>1</sup> is a handsome tree with alternate leaves, stipulate compound imparipinnate, with opposite folioles. Its axillary or super-axillary inflorescence is in ramified clusters of biparous cymes in which each flower occupies the axil of a small bract.

<sup>1</sup> COMMERS, ex. K. in *Ann. Sc. Nat.* sér. 1, ii. 350.—DC. *Prodr.* ii. 79.—ENDL. *Gen.* 5935.—

*Dammara* GÆRTN. *Fruct.* ii. 100, t. 103 (not RUMPH.).

In certain species of *Bursera*, described under the name of *Protium*,<sup>1</sup> in Asia, and of *Iceia*,<sup>2</sup> in tropical America, the leaves are imparipinnate or reduced to three folioles, usually entire, or even to a single one; the flowers have four or five parts; the fruit has an exocarp which is divided more or less distinctly in to panels of stones, and these are united by a slightly resistant columella. In the true *Burseras* of tropical America (fig. 269-274), the flowers are polygamous, 3-5-merous; the columella of the fruit is of greater consistence, the exocarp is detached more distinctly, usually in three divisions; the leaves collected towards the summits of the branches have three or a less number of thin and entire folioles. The divisions of the calyx, already deep and more elongated in these species,

*Bursera (Iceia) decandra.*



Fig. 275. Fruit.



Fig. 276. Transverse section of Fruit.

become still more so in certain species of *Elaphrium*,<sup>3</sup> American plants, glabrous or more often covered with hairs, having pinnate leaves, often brought together at the summits of the branches, whose folioles, three or more in number, become generally more coriaceous and denticulate; the rachis spreading out slightly in wings in their intervals. Thus constituted,<sup>4</sup> the genus *Bursera* contains forty to fifty species,<sup>5</sup> arborescent, balsamic, with more or less ramified inflorescence.

At the side of the *Bursera*, has been placed, not without some doubt, *Crepidospermum*, a Peruvian tree, having nearly the same male flower, but with an isostemous, pentamerous androecium, and whose fruit is a compressed drupe, slightly tetragonal, with two or three monospermous stones. The Balsams (*Balsamea*) are still more certainly closely allied to the *Bursera*. In these trees and

<sup>1</sup> BURM. *Fl. Ind.* (1768), 88 (not WIGHT and ARN.).—MARCH. in *Adansonia*, vii. 213, 260; viii. 21, 62.

<sup>2</sup> AUBL. *Guian.* i. 337, t. 130-135.—J. Gen. 370.—LAMK. *Diet.* iii. 224; Suppl. ii. 136; *Ill.* t. 303.—K. in *Ann. Sc. Nat.* sér. 1, ii. 349.—DC. *Prodr.* ii. 77.—SPACH. *Suit. à Buffon*, ii. 237.—ENDL. *Gen.* n. 5932.

<sup>3</sup> JACQ. *Stirp. Amer.* i. 105, t. 71.—K. in *Ann. Sc. Nat.* sér. 1, ii. 347.—DC. *Prodr.* i. 723 (part.).—ENDL. *Gen.* n. 5931.—MARCH. in *Adansonia*, viii. 22.

<sup>4</sup> Sect. 4: 1. *Marignia* (COMMERS.); 2. *Iceia*

(AUBL.); 3. *Eubursera*; 4. *Elaphrium* (JACQ.).

<sup>5</sup> SW. *Obs.* 130.—H. B. K. *Nor. Gen. et Spec.* vii. 26, t. 611-613 (*Elaphrium*).—DELESS.  *Ic. Sel.* ii. t. 55 (*Marignia*).—WIGHT et ARN. *Prodr.* i. 177 (*Iceia*).—BENTH. *Sulph.* t. 7, 8 (*Elaphrium*).—TUL. in *Ann. Sc. Nat.* sér. 3, vi. 368 (*Elaphrium*), 372 (*Iceia*).—TE. et PL. in *Ann. Sc. Nat.* sér. 3, xiv. 297 (*Iceia*), 302.—MARCH. in *Adansonia*, viii. t. 1, 3 (*Protium*).—GRISEB. *Pl. Brit. W.-Ind.* 173.—WALP. *Rep.* i. 558 (*Iceia*); ii. 830; v. 419 (*Elaphrium*); *Ann.* i. 201; ii. 289; iv. 449 (*Iceia*); vii. 547.

shrubs of tropical Africa, Asia and Oceania (fig. 277-279), having branches often thorny, and alternate leaves, imparipinnate or 1-3-foliolate, the polygamous flowers are usually tetramerous or diplostemonous, and the gynæceum generally reduced to two carpels. But these organs are nearly always inserted on a slightly concave receptacle, lined by a cup-shaped disk, so that their insertion is slightly perigynous. The fruit is a drupe, with one or more stones united together by the axis, and an exocarp separating in two or more valves. The seed contains an embryo with contortuplicate cotyledons.<sup>1</sup> In *Boswellia* (fig. 280-283), consisting of trees from the same regions, the flower is usually pentamerous with a trimerous gynæceum. The petals, more or less imbricate, and the diplostemonous androceum are also inserted on a very slightly concave receptacle, and are, accordingly, somewhat perigynous. The fruit (fig. 282-283) has three projecting angles or three obtuse and thick wings. On a level with these projections, the exocarp separates by vertical clefts in three panels separating from the central portion of the fruit. This then resembles a woody columella prolonged in three vertical wings, corresponding to the intervals of the cells, between which are seen three stones, cordiform or echinate (fig. 283), each containing a seed having a contortuplicate embryo with multifid cotyledons. The leaves of *Boswellia* are alternate and imparipinnate.

In the *Canarium*, beautiful trees of all the tropical regions of the

*Balsamea Opobalsamum.*



Fig. 277. Floriferous branch.



Fig. 278. Male flower (1/2).



Fig. 279. Longitudinal section of male flower.

<sup>1</sup> It is probably near *Balsamea* that we ought also to describe *Dasygarya*, given as a *Spondias*, and having polygamous flowers, pentamerous, with five petals, induplicate or slightly imbricate, ten stamens, a gynæceum with three biovulate cells, and a drupaceous fruit with trilobular stone. The exalbuminous seeds have an embryo with an inflected superior radicle. *D. grisea* is a tree with imparipinnate leaves and flowers in axillary spike-shaped clusters, in-

habiting the mountains of Mexico.

*Paivreusea*, a tree from Angola, unknown to us, is also brought near *Protium*; it is distinguished by digitate leaves, capitate inflorescence, surrounded by an involucre, and apetalous unisexual flowers, with an inconsiderable calyx, 6-8-lobate, and a like number of stamens. The fruit is a drupe with one or two stones, supported by a long peduncle and surrounded by an accrescent calyx.

Old World, whose leaves are alternate, imparipinnate, rarely 1-3-foliate, the polygamous flowers are nearly always trimerous, more rarely with four or five parts. The gamosepalous calyx and the petals, imbricate or nearly valvate, are inserted on a more or less

*Boswellia papyracea.*



Fig. 280. Hermaphrodite flower (♂).



Fig. 281. Longitudinal section of flower.

concave receptacle, often cup-shaped, more rarely in the form of a deep sac; this characterises *Santiria*, often separated generically from *Canarium* for this reason. The stamens, generally six in number, and more or less perigynous, are usually free, more rarely monadelphous at the base. The majority

*Boswellia papyracea.*



Fig. 282. Fruit.



Fig. 283. Dehiscent fruit.

of the characters of any importance are therefore most variable in this genus; but all its species have this in common, that their fruit is an elongated drupe, often trigonal, with a very thick and hard stone, hollowed into several cells, only one being usually developed, and containing a seed having a thick oily embryo with entire or cut and contortuplicate cotyledons.<sup>1</sup> The perigynous nature, that is to say, the concave form of the

receptacle, is still more accentuated in the *Garugas*, trees from Asia and Oceania, whose flowers are pentamerous, diplostemonous, having an ovary with four or five cells, and whose fruit is drupaceous, globular, but with many monospermous stones

<sup>1</sup> Near *Canarium* is placed *Trigonochlamys*, incompletely known and having polygamous, trimerous flowers. The sepals are very large, valvate; and the petals much shorter and narrower. The six stamens, sterile in the female flowers, are inserted on the edge of a small con-

tinuous disk surrounding the gynæceum. This has a free, globular, depressed ovary with three bi-ovulate cells. *T. Griffithii* is a tree from Malacca, with alternate, compound-imparipinnate leaves, and ramified inflorescence, axillary or terminal.

separating finally from one another. The leaves of *Garuga* are imparipinnate, exstipulate, with opposite tomentose folioles, and very ramified inflorescence.

*Hedwigia balsamifera*.



Fig. 284. Male flower (♂).

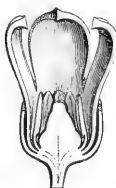


Fig. 285. Longitudinal section of male flower.



Fig. 286. Male flower without the perianth.



Fig. 287. Female flower (♀).



Fig. 289. Longitudinal section of female flower.

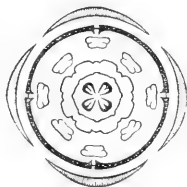


Fig. 288. Diagram of female flower.



Fig. 290. Female flower without the perianth.



Fig. 292. Fruit.



Fig. 291. Female flower without the perianth or androceum.



Fig. 293. Transverse section of flower.

*Hedwigia* (fig. 284–295) in other respects very analogous to *Bursera* in its whole organisation, must, however, be placed in a

small distinct subseries on account of the gamopetalous corolla. The polygamous flowers are 4-6-merous, the dentate calyx and the corolla being valvate, and the diplostemonous androecium (whose anthers are sterile in the female flower) formed of pieces inserted outside a large hypogynous disc, with lobes projecting in the intervals of the stamens. The gynæceum is that of *Bursera*; the ovary is voluminous,

*Hedwigia (Trattinickia) rhoifolia.*



Fig. 294. Male flower.



Fig. 295. Male flower without the perianth.

although sterile and full in the male flowers, whilst in the female it presents, opposite each petal, a cell having two collateral descendent ovules with superior and exterior micropyle. The fruit is a drupe with 1-5 hard stones, each containing a seed with a thick fleshy embryo, whose cotyledons are plano-convex. The four or five known species of *Hedwigia* are trees from tropical America, having alternate or sub-opposite imparipinnate leaves, with opposite folioles entire or denticulate. The numerous flowers are arranged in the axil of the leaves in ramified clusters of cymes.

Under the name of *Trattinickia*, are distinguished generically two or three other species of *Hedwigia* from tropical South America, whose pinnate folioles are entire, coriaceous, and the flowers (fig. 294, 295) trimerous; we only preserve them here as a section.

### III. ANACARDIUM SERIES.

*Anacardium*, from which this group takes its name, is not the most regular type, on account of the inequality of the parts of the androecium and the irregularity of the gynæceum. But we can study to commence with a genus with regular flowers, such as *Schinus*<sup>1</sup>

<sup>1</sup> L. Gen. n. 1130.—MILL. Icon. t. 246.—J. Gen. 371.—LAMK. Diet. iv. 229; Suppl. iii. 721; Ill. t. 822.—K. in Ann. Sc. Nat. sér. 1. ii. 139.—DC. Prodr. ii. 74.—SPACH. Suit. à Buffon, ii. 224.—ENDL. Gen. n. 5901.—B. H. Gen. 422, n. 15.—MARCH. Anacard. 52, 165.—Aroeira Pis. Bras. 64.—MOLLE CLUS. Exot. 322.—T. Inst. 661.

—ADANS. Fam. des Pl. ii. 341.—MULLI FEUILL. Per. iii. 43, t. 30.—DUROU K. in Ann. Sc. Nat. sér. 1. ii. 340.—DC. Prodr. ii. 74.—ENDL. Gen. n. 5902.—MARCH. loc. cit. 55.—B. H. Gen. 426, n. 35.—PIPTOCCLUS TURCZ. in Bull. Mosc. (1858), i. 449.—SARCOOTHECA TURCZ. loc. cit. 474.

(fig. 296–301). These flowers are polygamous or diœcious, with four or more often five parts. In the latter the receptacle, nearly flat or slightly convex, bears a calyx with five short imbricate divisions, and five alternate petals, very much longer, also imbricate

*Schinus Molle.*



Fig. 296. Hermaphrodite flower (♂).

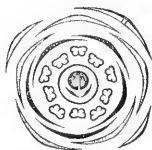


Fig. 297. Diagram.



Fig. 298. Longitudinal section of flower.



Fig. 300. Dry Fruit (♂).



Fig. 299. Hermaphrodite flower with the perianth removed.



Fig. 301. Transverse section of fruit.

in the bud. More inwardly are found two verticels of five stamens, superposed, five to the teeth of the calyx and five shorter ones to the petals. All are formed of a free filament inserted outside the base of an annular disc, with ten small alternate lobes; and of a bilocular introrse anther dehiscence by two longitudinal clefts.<sup>1</sup> The gynæceum is free, sterile in the male flowers, formed in the female by three carpels, two of which are abortive in the ovary. The cavity of the third encloses an ovule supported on a short funicle, sometimes (fig. 298) inserted on the side of the cell, and turning its micropyle inwards and upwards. The ovary is surmounted by three styles, each terminated by a stigmatiferous head. The fruit is a drupe,<sup>2</sup> with a thick stone generally traversed

<sup>1</sup> The pollen is "ellipsoid; three folds; in water, globular, having three bands with three papillæ." (H. MOHL, in *Ann. Sc. Nat. sér. 2*, iii. 340.) It is the same in several species of

of *Rhus*; also in the *Magnifera indica* and *Anacardium occidentale*, but without papillæ.

<sup>2</sup> The epicarp is often thick, brittle, glabrous, glossy; the mesocarp is generally slight.

in its thickness by oleaginous and resiniferous channels, and enclosing in its cavity a seed with slight albumen, surrounding an embryo having flat cotyledons and a superior radicle. The funicle which supports the ovule of *Schinus* detaches itself from the wall of the ovary at a variable height, sometimes towards the base of the cell, and sometimes not far from its summit; the ovule and, therefore, the seed are then more or less ascendent or descendent, without the micropyle ceasing to be superior; and we insist on this fact, that great importance should not be allowed it in the comparison among themselves of the other genera of this series. Fifteen species of *Schinus* have been admitted, all natives of the warm and temperate regions of America.<sup>1</sup> They are odoriferous trees and shrubs, with alternate leaves, imparipinnate or sometimes simple, as occurs in *Duvaua*, usually distinguished as a distinct genus. These last have the flowers collected in axillary spikes, solitary or fasciculate, whilst in *Schinus* proper,<sup>2</sup> they form, in the axils of the leaves and at the summit of the branches, ramified clusters of cymes.

*Sorindeia* has very nearly the flower of *Schinus*, but with valvate petals. The stamens are either equal in number to the petals (the rule in the female flowers where they remain sterile) or two to four times more numerous. The unilocular ovary is surmounted by a style with three stigmatiferous branches, and contains a single ovule, with superior micropyle supported by a funicle, basilar or united, sometimes in a very slight degree with the inferior part of the ovary wall, sometimes for a very considerable length and not detaching itself until at or above the middle of its height. This occurs in *Mauria*, consisting of American trees, with simple or compound pinnate leaves, inseparable however generically from *Sorindeia* proper, formed of species with pinnate leaves, from the tropical regions of the old world, and in which the funicle is free or united to the wall of the ovary for a slight distance. *Solenocarpus indicus*, an Asiatic tree, has the pentamerous flowers of *Sorindeia*, with an isostemonous androceum, a drupe obliquely oblong, and an embryo with linear cotyledons and compound pinnate leaves; but its unilocular ovary is surmounted by a simple clavate style, having its stigmatiferous summit obliquely truncate; this character seems to have only a secondary value here.

<sup>1</sup> CAV. *Icon.* t. 239 (*Amyris*).—C. GAY, *Fl. Chil.* ii. 41 (*Duvaua*).—TR. et PL. in *Ann. Sc. Nat.* sér. 5, xiv. 289.—ANDR. in *Bot. Repos.* t. 629.—LINDL. in *Bot. Reg.* t. 1568, 1673, 1680.—

HOOK. in *Bot. Mag.* t. 3339.—WALP. *Rep.* i. 550; v. 413; *Ann.* vii. 647 (*Duvaua*).

<sup>2</sup> Sect. *Euschinus* MARCH. *loc. cit.* 165.



*Tapirira* (fig. 302, 303) is also closely allied to *Sorindeia* by the diplostemonous flowers and unicarpellary gynæceum, with the same insertion of the descendent ovule; but they have an imbricated

*Tapirira* (Odina) Wodier.

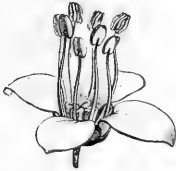


Fig. 302. Male flower ( $\frac{1}{2}$ ).

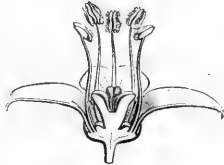


Fig. 303. Longitudinal section of male flower.

corolla like *Schinus*; and, on the other side, if we only consider the gynæceum of the male flowers, which, although sterile, is formed of four or five carpels in great part independent, they affect the closest affinities with the *Spondias*, especially those of the sub-genus *Poupartia* (fig. 258), only differing from them by a unilocular ovary and

*Gluta* Benghas.



Fig. 304. Hermaphrodite flower ( $\frac{1}{2}$ ).



Fig. 307. Hermaphrodite flower, the perianth removed.

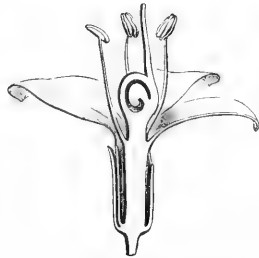


Fig. 306. Longitudinal section of hermaphrodite flower.

fruit. They are trees and shrubs, sometimes climbing, with impari-pinnate leaves, having 4- or 5-merous flowers, which have been observed in all tropical regions of the globe, except Australia.<sup>1</sup>

*Gluta* (fig. 304–307) has very nearly the same organisation

<sup>1</sup> We can only doubtfully place near *Tapirira*, *Hamatostaphis Barteri*, a small tree from western tropical Africa, with compound impari-pinnate leaves, whose male flowers are trime-

rous, with imbricate diplostemonous perianth, and the fruit a drupe with hard stone, containing a descendent exalbuminous seed. The female flower is unknown.

as *Schinus*. The membranaceous calyx is valvate, and the stamens, five in number, are alternate with the contorted petals, but the insertion of these latter is quite peculiar; it is made on the columnar

*Gluta Benghas.*



Fig. 305. Diagram.

receptacle, not only by the base, but also following a vertical mesial ridge which occupies the internal face to a rather large extent (fig. 306, 307). There results beneath each stamen a sort of adherent spur analogous to that of the posterior sepal of *Pelargonium*. The gynæceum has only one fertile cell, surmounted by a style and containing an ovule suspended above an

upright funicle. The fruit is drupaceous, monospermous. Half-a-dozen species of *Gluta* have been described, trees with simple leaves from tropical Asia and Madagascar.

In *Swintonia*, a tree with simple leaves from Malacca, the receptacle is elevated above the calyx in a column much less raised than in *Gluta*, and the petals are inserted also in a small vertical expanse,

*Loxostylis alata.*



Fig. 308. Male flower ( $\frac{2}{3}$ ).

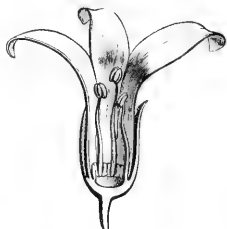


Fig. 309. Longitudinal section of male flower.

but they are attached by the edges and not by their mesial lines. The calyx is imbricate, like the petals which are persistent and grow around the base of the fruit. *Melanorrhæa*, consisting of trees from Malacca and Birmah, has also petals growing round the fruit; but this is a pedicellate drupe, and not sessile, like those of *Swintonia*, and the stamens are indefinite in number, sometimes considerable. *Astronium* is also very analogous to *Swintonia*; the insertion of the parts of the perianth is transverse. The calyx is pentamerous, imbricate, as is also the corolla, and the fruit is also surrounded by a large collarete studded

with accrescent and scarious appendages. But these appendages are dependent from the calyx, and not from the corolla. *Astronium* is formed of trees from tropical America with imparipinnate leaves. *Parishia*, a tree from Malacca, has also imparipinnate leaves, and round the fruit a large indusium formed by the accrescent calyx, but its wings are only four in number, like the petals and stamens, and the prefloration of the sepals valvate and not imbricate. *Loxostylis* (fig. 308, 309), a small tree from the Cape of Good Hope, also represents an allied genus in which the sepals are equally persistent and accrescent round the fruit in a foliaceous indusium, but its petals are slightly unequal, and especially its five stamens alternating with an equal number of bilobate glands. The ovary, with one fertile cell, is surmounted by three styles inserted more or less low towards the middle of one of its edges.

In *Loxopterygium*, formed of American trees with imparipinnate leaves, imbricate corolla and isostemonous androceum, the fruit is still accompanied by an aliform dilatation, but this expansion is dependent from the pericarp and not from the calyx, and recalls the lateral samara of *Securidaca* and certain leguminous plants. *Botryceas*, a shrub from the Cape, also has isostemonous flowers and a compressed fruit, with a membraneous, winged epicarp, garnished unilaterally by the persistent style; but it is easily distinguished by simple leaves and the dilated and compressed axes of its female inflorescence, which finish by making a sort of pectinate fasciation. In *Smodingium*, formed of shrubs from the same country and Mexico, they are also isostemonous, with imbricate corolla and samaroid fruit; but in these it is the edges of the pericarp that are dilated in wings on the whole of their periphery; the leaves are trifoliolate. *Faguetia falcata*, a tree from Madagascar, owes its specific name to the form of its fruit, also samaroid, elongated, flattened, attenuated at the two extremities, unilocular in its upper portion, but owing this appearance to the follicular dilatation of its inferior part. Its declinate flowers are usually tetramerous, isostemonous, with imbricate corolla, and its leaves are compound-pinnate.<sup>1</sup>

<sup>1</sup> There is, it seems, great resemblance between this genus and *Juliania*, a Mexican tree, very imperfectly known, whose imparipinnate leaves are analogous to those of most *Terebinthaceæ*, and whose fruit has also the form of an elongated samara. But its flattened portion is

formed by the dilated pedicel, surrounded by a swollen pericarp, unilocular (?), monospermous (often monstrous or deformed?). The flowers are dioecious, and the male have, it is said, four to eight leaves in the perianth, with an equal number of fertile stamens.

The Sumacs (*Rhus*) give their name to a subseries of *Rhoideæ*. They have polygamous flowers, with four or five parts (fig. 310, 311). Their receptacle has the form of a surbased cone or of a tray on whose edges are inserted an imbricate calyx and corolla. By this, their flower recalls very much that of *Schinus*, as also by the gynæceum whose ovary is surmounted by three styles, free or united at

*Rhus Cotinus.*

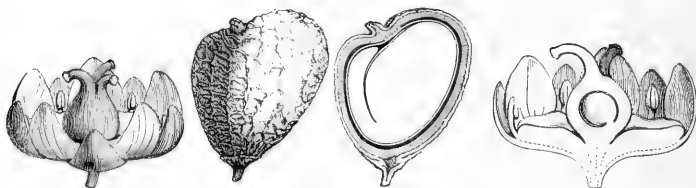


Fig. 310. Female flower (4). Fig. 312. Fruit (3) Fig. 313. Longitudinal section of fruit.

Fig. 311. Longitudinal section of female flower.

the base and stigmatiferous at the apex, but the androceum is nearly always isostemonous, formed, in consequence, of four or five alternipetalous stamens, inserted below the edge of a thick disk. The ascendent funicle supporting the only ovule may be inserted at the base or more or less high on the side of the ovary, but it is not attached above the middle of its height. The fruit (fig. 312, 313) is drupaceous, the mesocarp often nearly dry, more rarely pulpy, compressed, obovate, unsymmetrical or reniform; its stone, hard, coriaceous or crustaceous, contains an inverted seed, with thin coats and an embryo bent round upon itself; the organic summit of the cotyledons and of the arched radicle are directed towards the summit of the pericarp. This genus contains a hundred species from all the warm and temperate regions of the globe. They are trees and shrubs with resinous or burning poisonous juice, simple trifoliolate or compound pinnate leaves, and very variable inflorescence.

Beside the Sumacs are placed *Comocladia*, native of tropical America, only distinguished by two characters of very slight value; the petals three or, more rarely, four in number with an equal number of alternate stamens; and a fruit which is drupaceous and ellipsoidal, instead of being small and compressed or reniform.

A small distinct group might be formed of the Pistachias (fig. 260, 314-317) on account of the diminution of their

parts of their diœcious and apetalous flowers, only possessing a calyx of from two to five small imbricate leaves. In the male flowers around a rudimentary gynœceum (which may even disappear), only five stamens with introrse anthers are seen, and in the female, a gynœceum whose unilocular ovary is surmounted by a style with three branches, and containing an ovule suspended at the

*Pistacia vera.*



Fig. 316. Female flower (♀).



Fig. 314. Portion of male inflorescence.



Fig. 315. Male flower (♂).



Fig. 317. Longitudinal section of female flower.

summit of an upright and flattened funicle. The fruit (pistachio nut) is an unsymmetrical drupe whose flesh is of little thickness, the stone thin, and it may even become finally completely dry; it only contains one large seed with a fleshy embryo. The *Pistachias*, trees or shrubs with a resinous odour, compound leaves, pinnate or trifoliate, inhabit the Mediterranean region, temperate Asia and the western islands on the coasts of Africa and central America.

The double perianth reappears in the subseries of Mangos (*Mangifera*), whose polygamo-diœcious flowers (Fig. 318–320) have four or five sepals, and as many imbricate petals, four or five stamens, only one or two being fertile, inserted round a thick disc encircling the base of an uni-carpellary gynœceum. Its ovary contains a single ovule, borne by an ascendent funicle and inserted more or less close to the base of the cell; it is surmounted by a simple style. The Mangos are trees from southern Asia, introduced into all tropical countries. The fruit is a drupe with a large stone, fibrous outside, indehiscent or bivalvate. The leaves are simple and the flowers collected in ramified clusters of cymes. The organs of vegetation

are the same in the Cashews (fig. 321-324), which have also a double imbricate perianth in their polygamous flowers, and a uni-  
*Mangifera indica.*



Fig. 319. Hermaphrodite flower (♂).



Fig. 318. Portion of inflorescence.



Fig. 320. Longitudinal section of flower.

carpellary ovary with simple style. But the stamens, completely united at the base in a ring of but slight thickness, are double in  
*Anacardium occidentale.*



Fig. 322. Hermaphrodite flower without the perianth (♀).

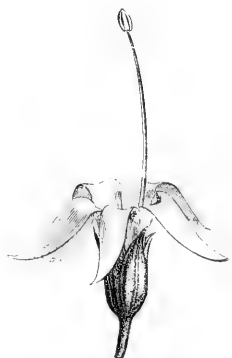


Fig. 321. Male flower (♂).



Fig. 323. Longitudinal section of hermaphrodite flower.

number to the petals. Only one of them, or two or three, more developed than the others, are provided with a well-shaped anther

containing pollen. The ovule is the same as that of the Mango at the base, though finally the funicle supporting it is inserted a little higher. The fruit (fig. 324) becomes dry, indehiscent and campylitropous; it contains a large reniform seed, and its peduncle, at first narrow and cylindrical, rather hard, finally becomes hypertrophous thick presenting the appearance of a piriform berry. *Anacardium* consists of trees from tropical America. In *Semecarpus*, an Asiatic tree with simple leaves, the dry fruit is also supported by a thick fleshy base, formed by the hypertrophy of the receptacle, which is more or less concave, so that, like the perianth, the five stamens are in this genus hypogynous or perigynous to various degrees, and the ovary surmounted by three style branches. In *Nothopegia*, a tree from the mountains of India, the flowers are tetramerous, with double imbricate perianth, and four stamens inserted on the edge of the disc; but the ovary is surmounted by a short simple style, and contains a nearly apiculate, descendent ovule. The fruit is a depressed apiculate drupe. The leaves are simple and alternate, and the flowers arranged in compound clusters, but slightly ramified.

*Campnosperma* has the same general organisation as the preceding genera, with three to four partite flowers, an imbricate corolla and a diplostemonous androecium. The ovule is descendent, with superior micropyle. But its fruit presents this peculiarity that it is divided by a false descendent partition into two unequal compartments. *Campnosperma* consists of trees with alternate and simple leaves. The inflorescence often has the principal axis unramified. These plants have been observed in tropical Asia, Madagascar, and even in Brazil, if

*Anacardium occidentale.*



Fig. 324. Longitudinal section of fruit.

we include in this genus the plant from the Amazon, with 4-5-merous flowers, that has been named *Cyrtospermum*, and then *Drepanospermum*.

In *Holigarna* and *Drimycarpus* formed of trees with simple leaves from tropical Asia, the flowers have also the general organisation of those of *Semecarpus*, differing however considerably in the receptacle being concave, enveloping the ovary which occupies the centre, whilst the perianth and androceum are inserted "epigynously" on the edges. The first has the corolla valvate and three distinct styles, whilst the latter has imbricate petals and a single style with stigmatiferous apex capitate and hardly trilobate.

*Thyrsodium*, consisting of trees from tropical America, with imparipinnate leaves, and which have been joined to a totally different group, that of the *Bursereæ*, approach *Drimycarpus* and *Holigarna* by their cupular receptacle. But the ovary, situated at the bottom of the receptacle, is however completely free. It contains a single cell with an ovule suspended at the summit of a funicle inserted above on the side of the cell, and the style surmounting it is single, like that of the *Anacardium*. The stamens, equal in number to the petals, at first imbricate, and with which they alternate, are also inserted on the edges of the receptacular cup.

Beside these genera may be placed *Pentaspadon*, trees from Borneo and Sumatra, having almost the flower of *Semecarpus*, with an ovary surmounted by a simple style in the female flower, but with two or three divisions in the male, where it remains sterile, and ten stamens, five of which, viz., those superposed to the petals, are reduced to stipitate glands; and *Corynocarpus*, a shrub from New Zealand, in which the alternipetalous staminodes are small petaloid blades, whilst the five fertile stamens are superposed to the petals, and its unilocular ovary, surmounted by a style having a capitate apex, contains, inserted on a parietal placenta, a descendent ovule, having the micropyle brought upwards under the point of attachment of a short funicle. The leaves of *Corynocarpus* are simple, whilst those of *Pentaspadon* are compound pinnate.

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## IV. MAPPIA SERIES.

There are great analogies between the flowers of *Mappia*<sup>1</sup> and those of *Corynocarpus*, from which they can only be said to differ essentially by the fertile stamens being alternipetalous and the existence of two collateral ovules instead of a single one. The flowers are sometimes polygamous and more generally hermaphrodite (fig. 325, 326).

*Mappia (Icacina) senegalensis.*



Fig. 325. Hermaphrodite flower ( $\frac{3}{4}$ ). Fig. 326. Longitudinal section of hermaphrodite flower.

On their short convex receptacle is inserted a gamosepalous calyx, with five<sup>2</sup> more or less deep divisions and five alternate petals, valvate in prefloration.<sup>3</sup> The androceum is formed of an equal number of alternipetalous hypogynous petals, also alternating with the lobes, usually but slightly developed, of an hypogynous disk; they have free filaments<sup>4</sup> and bilocular, introrse anthers, dehiscent by two longitudinal clefts.<sup>5</sup> The gynæceum is free, superior, formed by an unilocular ovary surrounded by a more or less developed disk, and

<sup>1</sup> JACQ. *Hort. Schænbr.* 22, t. 47 (nec SCHREB.). —MIERS, *Contrib.* i. 62 (part.), t. 6. —B. H. *Gen.* 351, n. 22. —H. BN. in *Adansonia*, iii. 367. —*Leretic* VELLOS. *Fl. Flum.* iii. 99, t. 2. —MIERS, *loc. cit.* 60, t. 7. —*Icacina* A. JUSS. in *Mém. Soc. Hist. Nat. Par.* i. 174, t. 9. —DC. *Prodr.* i. 534. —ENDL. *Gen.* n. 5488. —MIERS, *loc. cit.* 55, t. 4 (part.). —B. H. *Gen.* 352, n. 26.

<sup>2</sup> Exceptionally six.

<sup>3</sup> They are covered with hairs, sometimes on both sides, sometimes on one only. Their apex, as nearly always occurs in the plants of this

series, is inflexed and, joined to the summits of the other petals, forming a sort of small key-stone which hangs, in the bud, between the faces of the approached anthers.

<sup>4</sup> Sometimes narrow and linear, sometimes more or less thick and dilated at the base.

<sup>5</sup> In certain American species, the connective is dilated in its upper portion into a blade, flattened externally and internally and attenuated at the apex, towards the base of which are, internally, the two distant cells of the anther.

surmounted by a style, more or less eccentric,<sup>1</sup> more or less lengthened,<sup>2</sup> dilated at its apex into a small stigmatiferous head. On its anterior wall, the ovary cell presents a placenta bearing above two collateral descendent ovules, supported by an arched funicle sometimes dilated above the micropyle; this is directed inwards and upwards under the point of attachment, the raphe being dorsal. The fruit is a drupe, glabrous or pubescent, whose stone contains a descendent seed with abundant fleshy albumen, and in whose axis is found an inverted embryo, having a short superior radicle and large, foliaceous, thin cotyledons, flat, or arched.

*Emmotum fagifolium.*

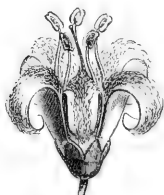


Fig. 327. Hermaphrodite flower (♂).

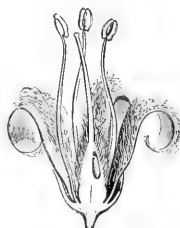


Fig. 328. Longitudinal section of hermaphrodite flower.

The *Mappias* are shrubs, sometimes climbing, or trees with alternate, simple leaves, generally entire, penninerved, reticulate. The flowers<sup>3</sup> are disposed in more or less ramified clusters of cymes rising from the axil of the leaves, but which, more often drawn up on the branches much higher than the axil, detach themselves laterally or are even united towards the summit in a kind of terminal panicles. These plants grow in most tropical countries; in tropical Africa where four or five species are known; in South America where quite as many are found; there is also a species, early known in the Antilles, and another very common and very variable in form in the East Indies.<sup>4</sup>

Beside *Mappia* are placed *Poraqueiba* and *Emmotum*, American

<sup>1</sup> In certain American species the base of the style is accompanied by two projecting horns, thick and obtuse (perhaps rudimentary styles?), also met with in several other genera of *Mappia*. On the side sometimes occupied by these projections, the style, more or less crooked, bears a longitudinal groove more pronounced in its inferior part.

<sup>2</sup> When it is most elongated, particularly in the African species attributed to the genus *Ica-*

*cina*, it is folded back more or less closely upon itself (once or twice) in the bud.

<sup>3</sup> The base, as usually happens in all the plants of this series, is hollowed into a slight depression or cup at whose bottom is articulated the attenuated apex of the pedicel.

<sup>4</sup> SAB. in *Trans. Hort. Soc.* iv. 453 (*Chrysobalanus*, ex Miers).—WIGHT, *Spic. Neilgher.* i. t. 23; *Icon.* t. 955 (*Stemonurus*).—GUILLEM. et PERR. *Fl. Sen. Tent.* i. 105 (*Icacina*).—MACF.

genera having usually the same flower, the petals of the former presenting inwardly on their middle line an appendage or projecting rib, which may exist in the latter, or be replaced by numerous hairs. The former has a biovulate unilocular ovary, like that of *Mappia*, with a short conical style having the stigmatiferous apex dilated and discoid. The latter has, on the contrary, in the ovary, three uni- or bi-ovulate cells all eccentric, and put forth on the same side; the lateral two are often uniovulate.

*Lasianthera*, originally from the warm regions of the old world, forms the head of a distinct sub-series, in which the calyx is gamosepalous, with divisions of more or less depth, as in the preceding genera, but the seed is provided with a very small apiculate embryo, having cotyledons very nearly as short as the superior radicle, and furnished towards the summit with an abundant fleshy albumen. In *Lasianthera* proper, the apex of the filament bears a long bunch of penicillate glandular hairs, which are at first inflected on the anther, whilst in *Gomphandra* these hairs are shorter and less abundant. In *Kummeria*, inhabiting tropical America, the flower and fruit, with projecting vertical ribs, are very nearly the same, but the petals have an interior projecting midrib, and a style immediately dilated in a discoid stigma, analogous to that of *Poraqueiba*, the fruit and embryo being those of *Lasianthera*. In *Pleurisanthes*, a plant from Guiana, the style is replaced by a bunch of papillæ, the petals are united in a cup detached by the base, the cells of the anther are thrown out from each side of the connective, and the flowers, small and numerous, are sessile on only one of the faces of the axis, flattened and as if fasciated by the inflorescence, exactly the same as in certain species of *Artocarpus*, of which moreover this plant has very nearly the aspect and foliage. In the *Desmostachys*, climbing plants from tropical western Africa and Madagascar, the flowers are very nearly those of *Lasianthera* of the section *Gomphandra*; the stamens have filaments, glabrous or loaded with short hairs, inserted on the back of the introrse anthers, and the flowers are united in slender and elongated spikes.

With the general character of the preceding genera, *Apodytes* and *Anisomallon* present this singularity that the adult fruits are bent or thrown back after the manner of campylotropical and anatropal ovules,

*Fl. Jam.* i. 122 (*Icacinia*).—DESF. *Cat. Hort.* OLIV. *Fl. trop. Afr.* i. 356 (*Icacinia*).—H. BN. *Par.* (1829), 405 (*Cajupar*).—THW. *Enum. Pl.* in *Adansonia*, xi. 17.  
*Zeyl.* 43.—GRISEB. *Fl. Brit. W.-Ind.* 310.—

and for the same reason, there is a difference of growth in their different portions. The scar of the style approaches therefore more or less to the base of the fruit, which, in *Apodytes*, may present on each side a small fleshy thickening. In the *Anisomallon*, inhabiting New

*Anisomallon elusiefolium.*

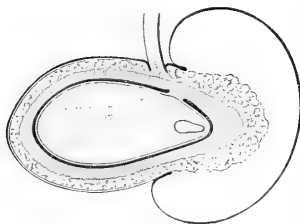


Fig. 329. Longitudinal section of fruit ( $\frac{3}{4}$ ).

Caledonia, this swelling becomes considerable, as voluminous as the fruit itself, a drupe with flesh of little thickness, accompanied on the side of the recurved micropyle by this bacciform mass (fig. 329). The calyx is that of *Lasiathera*. In *Anisomallon* the petals present within the internal face a projecting appendage perpendicular to their surface, dividing the concavity into two elongated niches in

each of which is sheltered an anther cell. Those of *Apodytes* are glabrous and naked. This last genus inhabits the warm regions of Asia and Africa.

In *Pennantia*, forming by itself a small secondary group, the general organisation of the polygamous-dioecious flowers is the same as in the preceding genera, but the calyx disappears almost completely, and is only represented by a small and but slightly projecting ring, the staminal filaments are folded twice upon themselves at the back of the anther, above their point of attachment, and the ovary is uniovulate. The *Pennantias* are Oceanian.

*Leptaulus*, consisting of shrubs from tropical Western Africa and Madagascar, is distinguished from all the preceding types by the gamopetalous corolla, tubular and sometimes very long, towards whose throat the stamens are attached. The flowers are arranged in cymes contracted and drawn up until beside a leaf much higher than that to the axil of which they in reality answer. The embryo is always, like those of the above genera, apiculate and very small, but the fleshy albumen is multilobate. At the same time the imbricate gamosepalous calyx is divided much more deeply. In the *Gonocaryum*, trees from tropical south-eastern Africa, the sepals become completely free. The valvate petals are joined together by the medium of the staminal filaments, but the corolla is not really in a single piece, like that of *Leptaulus*, of which *Gonocaryum* has

moreover the albumen and embryo. *Alsodeiopsis*, a shrub from tropical Africa, has nearly the flower of *Mappia*, with the petals united in the interior by the edges, and sepals free to the base, like those of *Gonocaryum*. In the *Plateas*, plants of the Indian Archipelago, the sepals and petals are free, and the ovary is surmounted by a thick stigmatiferous disk. The fruit is drupaceous, and the seed has a non-lobate albumen. *Villaresia*, inhabiting both South America and Oceania, has the petals imbricate in the lower part, often valvate and inflexed at the summit with a side projecting inwardly, the anthers reniform-cordate, a short style with oblique stigmatiferous apex, and a drupaceous fruit, ellipsoid, the placentary projection jutting out in a groove of the seed. *Sarcanthium*, a climbing shrub from New Caledonia, has the fruit and seed of *Villaresia*, to which it is closely allied. The free sepals are thickened in the lower part into a fleshy decurrence forming a sheath round a very short pedicel. The imbricate petals are joined closely to each other in a corolla detached circularly by the base, the anthers have two independent cells obliquely divergent, and the flowers are arranged in a long common cluster in scorpioid contracted cymes. In *Cassinopsis*, shrubs from the Cape and Madagascar, the flowers are those of the *Mappia* in general, with imbricate petals hardly united at the lower part by the medium of the staminal filaments. The sepals are very nearly free or united in the lower portion. But the aspect and foliage of these plants are completely those of *Celastraceæ*, the leaves are opposite, and the flowers are united in axillary, pedunculate, biparous, compound cymes.

*Grisollea myriantha*, a tree from Madagascar, with alternate leaves, represents in this group a type completely exceptional in the organisation of its dioecious flowers. The male have a gamosepalous calyx, with five divisions, and five stamens with extrorse anthers, inserted round a rudimentary gynæceum. The female have a calyx, five small petals and five stamens, with rudimentary anthers. The biovulate ovary is a cylinder, sometimes slightly arched, surmounted by a sort of glandular and circular plate from whose centre rises a short apicula. The hardly fleshy, flattened fruit, is organized like that of the *Lasianthera* and *Kummeria*; the nearly apiculate embryo is very small.

## V. PHYTOCRENE SERIES.

The flowers of *Phytocrene*<sup>1</sup> (fig. 330-333) are diœcious, very analogous to those of *Mappia*. In the male a small convex receptacle supports a perianth,<sup>2</sup> with three or four valvate leaves, more or less coherent at first at the base, then completely free, reflexed at the apex, valvate in the prefloration. The androecium is composed of an equal number of alternate stamens, whose free exserted filaments

*Phytocrene macrophylla.*

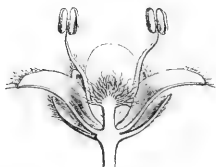


Fig. 330. Male flower ( $\times$ ).



Fig. 331. Longitudinal section of female flower ( $\times$ ).

are attached towards the base of a small rudiment of a columnar, upright gynœceum, surmounted by a more or less voluminous bundle of hairs. The anthers are introrse, the two cells, independent of each other, and each opening by a longitudinal cleft, inserted towards the middle of their height at the edges of a small rectangular connective. In the female flowers, the perianth is nearly the same as in the male, sometimes persistent round the base of the fruit, with three or four valvate leaves. In the intervals of these are found staminodes, equal or fewer in number, very small and glandular-shaped. The gynœceum is free, formed by an unilocular ovary, surmounted by a large upright cylindrical or clavate style, traversed in its whole

<sup>1</sup> WALL. in *Phil. Mag.* (1823), iii. 223; *Pl. As. Rar.* iii. 11, t. 126.—R. BR. in *Bonn. Pl. Jav. Rar.* 245.—GRIFF. *Notul.* iv. 320.—ENDL. *Gen.* n. 4698.—MEISSN. *Gen.* 152; *Comm.* 109.—BL. *Rumphia*, iv. 36; *Mus. Lugd.-Bat.* i. 41.—B. H. *Gen.* 154, n. 31.—H. BN. in *Adansonia*, jii. 363; x. 262 in *DC. Prodr.* xvii. 9.—*Gynoe-*

*phala* BL. *Bijdr.* 483.—*Gynoecephalum* ENDL. *Gen.* n. 1870.—TRÉCUL, in *Ann. Sc. Nat.* sér. 3, viii. 147.

<sup>2</sup> It probably represents a corolla, outside which is an epicalyx generally described as a calyx.

length by a narrow infundibuliform channel, and terminated by an irregular stigmatiferous head with two or three unequal lips. In the ovary cell is seen, near the summit, a parietal placenta supporting two collateral descendent anatropous ovules, with dorsal raphe, the micropyle directed inwards and upwards under the point of attachment. The fruit (fig. 332, 333) is a large elongated apiculate

*Phytocrene luzoniensis.*

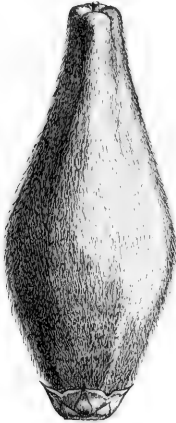


Fig. 332. Fruit.

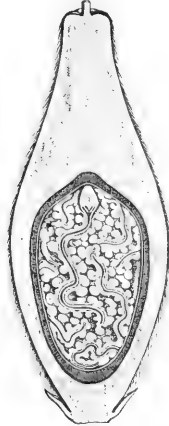


Fig. 333. Longitudinal section of fruit.

drupe, covered with hairs or points which often fall finally. Its stone is hard, prolonged above in a summit crowded with resinous vesicles, and hollowed below in a monospermous cell. The descendent seed contains, under a thin subpulpy skin, a fleshy, corrugated and multilobate albumen granular outwardly, covering all over with a thin layer, the very large foliaceous cotyledons with which it is several times folded upon itself. The radicle is superior, short and thick, more or less swollen into a cone or sphere. *Phytocrene* consists of shrubs of Asia and tropical Oceania. The stalks, whose development may be enormous, are sarmentous, climbing or volubile, often covered with hairs or prickles. The alternate petiolate leaves are entire, minute or palmilobate, 3-7-nervate at the base, often loaded with a very prominent network of nerves. The flowers are united in capitules,

small and numerous for the male, solitary and voluminous for the female.<sup>1</sup> The female capitule is supported by a thick peduncle. The small male capitules are united in a large divided cluster, bearing small ramifications terminated by a sterile bractiform apex, with a variable number of small globular floral groups beneath it. Just outside the leaves of the perianth, in the flowers of both sexes, are observed bractlets, often described as sepals, but whose number is not always equal to that of the pieces of the perianth, with which moreover they do not alternate exactly, there are from two to five, more rarely six to ten, and they are at first joined together in a kind of small sac, hairy or rather hispid outwardly. We ought to consider them as the leaves of an epicalyx. Eight species of this genus are known.<sup>2</sup>

In the same group as *Phytocrene* is placed *Miquelia*, climbing shrubs from tropical Asia and the Indian Archipelago, having the female flowers collected in small capitules, but the male united in umbels. The staminal filaments are longer than the anthers. The fruit is drupaceous and glabrous, the mesocarp spreads in an equal layer round the stone. The rectilinear embryo is surrounded by a smooth or slightly rugose albumen. *Sarcostigma*, having the same aspect and inhabiting the same regions, has the flowers arranged in long interrupted spikes. The staminal filaments are also longer than the anthers, and the style is immediately swollen in a subsessile stigmatiferous mass. The embryo is exalbuminous, and the cotyledons thick and fleshy. In *Natsiatum*, a sarmentaceous shrub from the East Indies, the flowers of both sexes are arranged in racemes the staminal filaments are very short, the style has linear branches, and the seeds have an embryo with foliaceous cotyledons, surrounded by a fleshy albumen. *Pyrenacantha* has the aspect and foliage of *Natsiatum*, and the flowers in racemes or spikes. But the perianth is simple, not surrounded by an exterior epicalyx. The fruit, like the gynæceum, is superior accompanied by the non-acrescent perianth. The stone is covered inwardly by aculeate projections penetrating the fleshy albumen of the seed, whose embryo has foliaceous cotyledons. Close to *Pyrenacantha*, inhabiting India and tropical and southern Africa, ought to be placed *Chlamydocarya* which,

<sup>1</sup> The capitules of the fruit may acquire the dimensions of a child's head.

<sup>2</sup> H. BN. *Prodr. loc. cit.* 9-13.—GRIFF. *loc.*

*cit.* t. 487, 490, 496.—MRO. *Mus. Ludg.-Bot.* iii. 248, t. 7.—WALP. *Rep.* i. 98; *Ann.* ii. 22; vii. 569.



remarkably enough, with most of the characters of the latter, has a concave receptacle, and, accordingly, a fruit half inserted in this receptacle (fig. 334), whilst the perigynous, gamophyllus perianth, persistent and accrescent, covers it like a long cap lengthened into a tube. The two species of *Chlamydocarya* known are from tropical Africa; the female flowers are united in spikes or capitules. In *Iodes* belonging to tropical Asia, Oceania and Africa, the flowers are arranged in compound cymes. The flowers have an inferior perianth, accompanied or not by an exterior calicule. The fruit is superior, with a seed whose embryo has foliaceous cotyledons surrounded by a fleshy albumen. They consist of sarmentaceous or climbing shrubs, provided with tendrils, and having opposite leaves.

*Chlamydocarya Thomsoniana.*



Fig. 334. Longitudinal section of fruit.

Following the *Phytocreneæ* has been placed with some doubt *Cardiopteris*, whose name comes from the marginal wings accompanying the dry fruit, and which probably is quite as much allied to *Mappia* by the hermaphrodite flowers provided with a double perianth, that is to say, a true calyx and an imbricate gamopetalous corolla, and an androceum of five stamens borne by the corolla and alternate with its divisions. The ovary only contains one ovule, which recalls that of *Pennantia*. The only *Cardiopteris* known is a perennial, herbaceous or suffrutescent, climbing plant, with milky sap, inhabiting tropical Asia and Oceania.

This family, as we have described it, is manifestly a family "by concatenation," and there is at first sight little resemblance between the first and last types, but if it is correct to say, after seeing them together, that there is not the slightest affinity between a *Phytocrene* and a *Spondias* or *Bursera*, it is not less true that many species of *Mappia*, for example, have flowers constituted very nearly like those of *Phytocrene*, and that between the *Mappia* and the *Corynocarpus*, inseparable, nevertheless from certain species of *Anacardium*, there

are the closest affinities in the floral organisation. A. L. DE JUSSIEU,<sup>1</sup> after many others,<sup>2</sup> it is true, had united in one and the same order, the *Terebinthaceæ*, not only the species of *Anacardium* he knew, but also several *Rutaceæ*, as *Amyris*, *Toddalia*, *Spathelia*, *Simaba*, *Ailantus*, *Cneorum*, *Brucea*, *Zanthoxylon*, and *Ptelea*; the *Juglans*; the *Sapindaceæ*, like *Dodonæa*; the *Connaraceæ*, such as *Rourca*, *Cnestis*, and *Connarus*; a leguminous plant then badly known, *Toluifera*, and *Averrhoa*, which is inseparable from the Sorrels. It was KUNTH who, in 1824,<sup>3</sup> gave the most complete table of *Terebinthaceæ*, comprising: 1st, the *Anacardææ* of R. BROWN,<sup>4</sup> that is to say, the genera *Anacardium*, *Rhinocarpus*, *Mangifera*, *Cambessedea*, *Semecarpus*, *Rhus*, *Buchanania*, *Mauria*, *Pistacia*, *Schinus*, *Duvauxia*, *Astronium*, *Comocladia*, and *Sorindeia*; 2nd, *Juglandææ* (*Juglans*, *Carya*, *Pterocarya*, and (?) *Decosteæ*); 3rd, The *Burseraceæ*, comprising *Elaphrium*, *Boswellia*, *Balsamodendrum*, *Iceia*, *Protium*, *Bursera*, *Marignia*, *Colophonia*, *Canarium*, and *Hedwigia*; 4th, The *Amyridææ*, that is to say, the single genus *Amyris* (which he already suspected to be more allied to the *Aurantiaceæ*); 5th, The *Pteleaceæ*, i. e. *Ptelea*, *Bluckburnia*, *Toddalia*, *Cneorum*, *Spathelia*, and (?) *Ailantus*; 6th, The *Connaraceæ*, with *Brunellia*, and *Brucea*, which he doubtfully joined with it; 7th, *Spondiaceæ* (*Spondias* and *Poupartia*). He excluded *Rumphia* of LINNÆUS,<sup>5</sup> a genus yet very little known at that epoch;<sup>6</sup> *Toluifera*, reckoned as congeneric to *Myroxylon*, that is to say, with the *Leguminaceæ*; *Tapiria*, which he was without doubt unable to study; *Simaba* and *Zanthoxylon*, whose true place he recognised amongst the *Rutaceæ*; *Dodonæa*, of which he made a *Sapindaceæ*; *Averrhoa*, whose affinity with *Oxalis* R. BROWN had shown; *Stylobasium*, which he joined to the *Chrysobalanææ*; *Heterodendron*, also supposed by him to be more allied to the *Sapindaceæ*. A year later DE CANDOLLE reckoned very nearly

<sup>1</sup> *Gen.* (1789), 368, Ord. 12.

<sup>2</sup> Their opinions are given in full, in a special work by MARCHAND: *History of the ancient Group of Terebinthaceæ* (Paris, 1869). We must principally cite amongst the predecessors of A. L. DE JUSSIEU, his uncle B. DE JUSSIEU (*Gen. lex. Terebinti*) and ADANSON (*Fam. des Pl.* ii. (1763), 332, *Fam.* 44, *Pistaciæ*).

<sup>3</sup> In *Ann. Sc. Nat.* sér. 1. ii. 333.

<sup>4</sup> *Congo*, 431 (1818); *Misc. Works* (ed BENN.), i. 111.

<sup>5</sup> *Gen.* n. 47.

<sup>6</sup> It is again assigned now, though with doubt, to the *Anacardiaceæ*, *Spondias* tribe, by BENTHAM and HOOKER (*Gen.* 428, n. 43); but

no one has been able up to the present to study an authentic specimen. Its flowers are described as trimerous, with a tubular calyx, 3-fid, three petals, three exserted stamens alternate with the petals, and a triangular ovary, surmounted by a simple style. Its fruit is drupaceous, with a 3-locular and 3-spermous stone. It is a tree from Malabar, with simple, alternate, dentate, aromatic leaves and flowers in racemes. *R. amboinensis* L. (*Syst.* i, 92) or *R. tiliaefolia* LAMK. *Dict.* vi. 352; *Ill.* t. 25), will be the *Tsientani* of RHEEDE (*Hort. Malab.* iv. 25, t. 11). It has also been supposed that it may be a badly described *Euphorbiaceæ*.

the same *Terebinthaceæ*,<sup>1</sup> dividing them into: *Anacardiaceæ*, to which he joined the *Holigarna* of ROXBURGH and *Pieramnia*; *Sumachinaceæ* (*Rhus*, *Mauria*, *Duraua*, and *Schinus*); *Spondiaceæ*; *Burseraceæ* uniting the *Garuga* of ROXBURGH;<sup>2</sup> *Amyrideæ* and *Pteleaceæ*, limited as in the work of KUNTH; *Connaraceæ*, comprising, besides the three genera enumerated by KUNTH, *Eurycoma*, *Brunellia*, *Brucea*, *Tetradium*, and *Ailantus*. He enumerated afterwards as doubtful or imperfectly known types, the genera *Dietyoloma*, *Triceros*, *Trattinickia*, *Huerteu*,<sup>3</sup> *Asaphes*, *Rumphia*, *Philagonia*, *Tapiria*, *Cyrtocarpa*, *Thysanus*, *Barbylus*, *Suriana*, *Lunanea*, *Heterodendron*, and *Stylobasium*, that is to say, principally *Rutaceæ* and *Sapindaceæ*; but he definitely excluded the family of *Juglandæ*, which will perhaps be reunited sooner or later after the example of ENDLICHER. Following closely the inspiration of R. BROWN, he considered as so many distinct orders, in a class of *Terebinthineæ*,<sup>4</sup> the secondary groups of KUNTH, that is to say, the *Juglandæ*; the *Anacardiaceæ*, to which are joined *Spondias* and *Sabia*; *Burseraceæ*, with which is connected *Amyris* as an allied genus; the *Connaraceæ*, then all the series we have enumerated in the family of *Rutaceæ*. The successors of ENDLICHER, particularly BENTHAM and HOOKER<sup>5</sup> and MARCHAND, in placing the *Juglandæ* among the apetalous series, maintained as perfectly distinct and separate families the *Burseraceæ*, *Sabiaceæ*, and *Anacardiaceæ*, the latter comprising the *Spondias* as a simple tribe, and the former containing under the same title, the *Amyrideæ*, that is to say, the species of *Amyris*, which are *Rutaceæ*, and *Hemprichia* EHRENB., a true *Bursera* of the genus *Balsamea*. TRIANA and PLANCHON have, in 1872,<sup>6</sup> brought into a single family the *Burseraceæ* and *Anacardiaceæ*; we can only accentuate more strongly their opinion, in making the *Burseraceæ* a series of *Terebinthaceæ*, interposed to *Spondia* and *Anacardium*. On the other side, we have shown<sup>7</sup> how the species of *Mappia* until now united to the *Olucineæ*, of which they have, moreover, certain characters, differ completely, however, by their alternipetalous stamens, the composition of their gynæceum and the manner of placentation, at the same time by all these characters they approach the complete organisation of the *Anacardiæ*; and it

<sup>1</sup> *Prodr.* ii. (1825), 61, Ord. 62.

<sup>2</sup> *Pl. Corom.* (1819).

<sup>3</sup> *Gen.* 1125, Cl. 57.

<sup>4</sup> Probably anormal *Sapindaceæ*.

<sup>5</sup> *Gen.* (1862), 321, Ord. 42; 413, Ord. 52; 415, Ord. 53.

<sup>6</sup> In *Ann. Sc. Nat.* sér. 5, xiv. 286 (1872).

<sup>7</sup> I *Adansonia*, xi. 202, (1874).

follows that the *Phytocrenæ*, inseparable on the whole from the *Mappiæ*, ought, by connection, to be put in the same family. This is then found divided in five series or tribes whose distinctive characters are as follow :

I. SPONDIÆ.<sup>1</sup>—Gynæceum, formed of many carpels, independent or united in their ovary. Cells 1-ovulate. Ovules descendent, with superior and interior micropyle. Seeds exalbuminous. Leaves simple or compound.—3 genera.

II. BURSERÆ.<sup>2</sup>—Gynæceum with many carpels (2-6) united below in a plurilocular ovary. Cells 2-ovulate. Ovules descendent, superior and exterior micropyle. Seeds exalbuminous. Leaves compound, 1- $\infty$ -foliolate.—9 genera.

III. ANACARDIÆ.<sup>3</sup>—Gynæceum with one or more carpels, only one of them fertile in the ovary. Single cell 1-ovulate. Ovule having very variable direction,<sup>4</sup> always having the micropyle directed upwards primitively. Seeds with but little abundant albumen or none. Leaves simple and compound.—29 genera.

IV. MAPPIÆ.<sup>5</sup>—Gynæceum with one or more<sup>6</sup> carpels, only one amongst them (rarely two or three) fertil. in the ovary. Single cell, 1- or more often 2-ovulate. Ovules descendent, with interior and superior micropyle. Seeds with entire or lobate albumen, embryo very small or developed, and provided with large and foliaceous cotyledons. Leaves simple.—15 genera.

V. PHYTOCRENÆ.<sup>7</sup>—Gynæceum constructed like that of *Mappiæ*.

<sup>1</sup> *Spondiææ* K. in *Ann. Sc. Nat.* sér. 1, ii. 362.—ENDL. *Gen.* 1134.—J. G. AGARDH, *Theor. Syst.* 220.—*Spondiææ* (*Anacardiææ* trib. 2) B. H. *Gen.* 417, 426 (part.).

<sup>2</sup> *Burserææ* K. in *Ann. Sc. Nat.* loc. cit. 333.—DC. *Prodr.* ii. 75.—LINDL. *Introd.* ed. 2, 110.—ENDL. *Gen.* 1135, Ord. 246.—B. H. *Gen.* 321, Ord. 42.—J. G. AG. *op. cit.* 219.—MARCH. in *Adansonia*, viii. 17.—BAKER, *Fl. Maurît.* 43.—*Amyridææ* R. BR. *Congo*, loc. cit.—*Amyridææ* LINDL. *Veg. Kingd.* (1816), 459, Ord. 171.

<sup>3</sup> *Casuarîææ* (v. *Anacardææ*) R. BR. *Congo*, loc. cit.—*Anacardiææ* LINDL. *Introd.* ed. 2, 166; *Veg. Kingd.* 465, Ord. 174.—ENDL. *Gen.* 1127, Ord. 245.—B. H. *Gen.* 415, Ord. 53.—L. MARCH. *Des Térébinthacées* (*Angard.*)... Paris (1869).—BAKER, *Fl. Maurît.* 61.—*Sumachinææ* DC. *Prodr.* ii. 66.

<sup>4</sup> It is inserted in the internal angle of the cell, but at a very variable point (and that often in the same type) of its length, from the base

close up to the summit. Accordingly it becomes with age more or less ascendent or descendent, a direction which has not, in consequence, much value and which also depends on whether the support of the ovule may be longer or shorter, and carry back the insertion of the umbilicus to a greater or less height.

<sup>5</sup> H. BN. in *Adansonia*, iii. 354; x. 261, xi. 187.—*Icacinææ* BENTH. ex LINDL. *Veg. Kingd.* 441 (*Olacææ* sect.).—B. H. *Gen.* 341, 350 (*Olacineæ* trib. 3).—*Icacinææ* MIERIS, *Contrib.* i. 34, 48.

<sup>6</sup> Generally three.

<sup>7</sup> ENDL. *Gen.* 828.—R. BR. in *Bonn. Pl. Jar. Rar.* 244.—B. H. *Gen.* 354 (*Olacin.* trib. 4).—H. BN. in *DC. Prodr.* xvii. 7.—*Artocarpæum* gen. BL. *Bijdr.* 483.—LINDL. *Veg. Kingd.* 271.—TRÉCUL. in *Ann. Sc. Nat.* sér. 3, viii. 147 (nec 148, in not.).—? *Cardiopteridææ* R. BR. loc. cit. 248.—BL. *Rumphia*, iii. 205.—SCHNIZL. *Iconogr.* fasc. 14.—H. BN. *Prodr.* loc. cit. 25.

Single cell. 1-2-ovulate. Ovules descendent, with superior and interior micropyle. Seeds without or, more often, with albumen, entire or lobate. Stems climbing. Leaves simple. Flowers dioecious, monoperianthate (except in *Candollea*) with or without epicalyx.—2 genera.

The types wrongly attributed to it, or whose place is still uncertain, being removed, this family contains sixty-seven genera all belonging to the warmest countries of the world. The *Phytococcus*, twenty-two species of which are at present known, all belong to the tropical and sub-tropical regions of the old world. The *Mappia* have four American genera, two common to both worlds and eleven peculiar to the old world. The latter contain forty species. The genera proper to America comprise ten, and of the twenty-five species of these common to both worlds a dozen are limited to the old. The majority of *Bursera* belong to the old world, which, of nine genera, owns five, including nearly eighty species out of the hundred and thirty constituting the series. The three genera peculiar to America only include ten species. The *Bursera*, which, as we

These are, besides *Limonia*, of which we have spoken before (p. 181, note 1):

1st. *Limonia* DC. in Fl. Antillar., vol. 1796. 217:—Eleg. Cor. 2. 1828. A Chinese tree with unimpunctate leaves, petioles with prominent nerves, compound umbels and fruit consisting of closed, 4-lobed, more or less fleshy, and has been compared to *Passiflora* and appropinquates perhaps, on account of its numerous stamens. *Mémoires*, &c.

2nd. *Bumel* Miers, in Journ. Bot. Soc. Lond. 1844. 1845. 1846. 1847. 1848. 1849. 1850. 1851. 1852. 1853. 1854. 1855. 1856. 1857. 1858. 1859. 1860. 1861. 1862. 1863. 1864. 1865. 1866. 1867. 1868. 1869. 1870. 1871. 1872. 1873. 1874. 1875. 1876. 1877. 1878. 1879. 1880. 1881. 1882. 1883. 1884. 1885. 1886. 1887. 1888. 1889. 1890. 1891. 1892. 1893. 1894. 1895. 1896. 1897. 1898. 1899. 1900. 1901. 1902. 1903. 1904. 1905. 1906. 1907. 1908. 1909. 1910. 1911. 1912. 1913. 1914. 1915. 1916. 1917. 1918. 1919. 1920. 1921. 1922. 1923. 1924. 1925. 1926. 1927. 1928. 1929. 1930. 1931. 1932. 1933. 1934. 1935. 1936. 1937. 1938. 1939. 1940. 1941. 1942. 1943. 1944. 1945. 1946. 1947. 1948. 1949. 1950. 1951. 1952. 1953. 1954. 1955. 1956. 1957. 1958. 1959. 1960. 1961. 1962. 1963. 1964. 1965. 1966. 1967. 1968. 1969. 1970. 1971. 1972. 1973. 1974. 1975. 1976. 1977. 1978. 1979. 1980. 1981. 1982. 1983. 1984. 1985. 1986. 1987. 1988. 1989. 1990. 1991. 1992. 1993. 1994. 1995. 1996. 1997. 1998. 1999. 2000. 2001. 2002. 2003. 2004. 2005. 2006. 2007. 2008. 2009. 2010. 2011. 2012. 2013. 2014. 2015. 2016. 2017. 2018. 2019. 2020. 2021. 2022. 2023. 2024. 2025. 2026. 2027. 2028. 2029. 2030. 2031. 2032. 2033. 2034. 2035. 2036. 2037. 2038. 2039. 2040. 2041. 2042. 2043. 2044. 2045. 2046. 2047. 2048. 2049. 2050. 2051. 2052. 2053. 2054. 2055. 2056. 2057. 2058. 2059. 2060. 2061. 2062. 2063. 2064. 2065. 2066. 2067. 2068. 2069. 2070. 2071. 2072. 2073. 2074. 2075. 2076. 2077. 2078. 2079. 2080. 2081. 2082. 2083. 2084. 2085. 2086. 2087. 2088. 2089. 2090. 2091. 2092. 2093. 2094. 2095. 2096. 2097. 2098. 2099. 2100. 2101. 2102. 2103. 2104. 2105. 2106. 2107. 2108. 2109. 2110. 2111. 2112. 2113. 2114. 2115. 2116. 2117. 2118. 2119. 2120. 2121. 2122. 2123. 2124. 2125. 2126. 2127. 2128. 2129. 2130. 2131. 2132. 2133. 2134. 2135. 2136. 2137. 2138. 2139. 2140. 2141. 2142. 2143. 2144. 2145. 2146. 2147. 2148. 2149. 2150. 2151. 2152. 2153. 2154. 2155. 2156. 2157. 2158. 2159. 2160. 2161. 2162. 2163. 2164. 2165. 2166. 2167. 2168. 2169. 2170. 2171. 2172. 2173. 2174. 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2673. 2674. 2675. 2676. 2677. 2678. 2679. 2680. 2681. 2682. 2683. 2684. 2685. 2686. 2687. 2688. 2689. 2690. 2691. 2692. 2693. 2694. 2695. 2696. 2697. 2698. 2699. 2700. 2701. 2702. 2703. 2704. 2705. 2706. 2707. 2708. 2709. 2710. 2711. 2712. 2713. 2714. 2715. 2716. 2717. 2718. 2719. 2720. 2721. 2722. 2723. 2724. 2725. 2726. 2727. 2728. 2729. 2730. 2731. 2732. 2733. 2734. 2735. 2736. 2737. 2738. 2739. 2740. 2741. 2742. 2743. 2744. 2745. 2746. 2747. 2748. 2749. 2750. 2751. 2752. 2753. 2754. 2755. 2756. 2757. 2758. 2759. 2760. 2761. 2762. 2763. 2764. 2765. 2766. 2767. 2768. 2769. 2770. 2771. 2772. 2773. 2774. 2775. 2776. 2777. 2778. 2779. 2780. 2781. 2782. 2783. 2784. 2785. 2786. 2787. 2788. 2789. 2790. 2791. 2792. 2793. 2794. 2795. 2796. 2797. 2798. 2799. 2800. 2801. 2802. 2803. 2804. 2805. 2806. 2807. 2808. 2809. 2810. 2811. 2812. 2813. 2814. 2815. 2816. 2817. 2818. 2819. 2820. 2821. 2822. 2823. 2824. 2825. 2826. 2827. 2828. 2829. 2830. 2831. 2832. 2833. 2834. 2835. 2836. 2837. 2838. 2839. 2840. 2841. 2842. 2843. 2844. 2845. 2846. 2847. 2848. 2849. 2850. 2851. 2852. 2853. 2854. 2855. 2856. 2857. 2858. 2859. 2860. 2861. 2862. 2863. 2864. 2865. 2866. 2867. 2868. 2869. 2870. 2871. 2872. 2873. 2874. 2875. 2876. 2877. 2878. 2879. 2880. 2881. 2882. 2883. 2884. 2885. 2886. 2887. 2888. 2889. 2890. 2891. 2892. 2893. 2894. 2895. 2896. 2897. 2898. 2899. 2900. 2901. 2902. 2903. 2904. 2905. 2906. 2907. 2908. 2909. 2910. 2911. 2912. 2913. 2914. 2915. 2916. 2917. 2918. 2919. 2920. 2921. 2922. 2923. 2924. 2925. 2926. 2927. 2928. 2929. 2930. 2931. 2932. 2933. 2934. 2935. 2936. 2937. 2938. 2939. 2940. 2941. 2942. 2943. 2944. 2945. 2946. 2947. 2948. 2949. 2950. 2951. 2952. 2953. 2954. 2955. 2956. 2957. 2958. 2959. 2960. 2961. 2962. 2963. 2964. 2965. 2966. 2967. 2968. 2969. 2970. 2971. 2972. 2973. 2974. 2975. 2976. 2977. 2978. 2979. 2980. 2981. 2982. 2983. 2984. 2985. 2986. 2987. 2988. 2989. 2990. 2991. 2992. 2993. 2994. 2995. 2996. 2997. 2998. 2999. 3000. 3001. 3002. 3003. 3004. 3005. 3006. 3007. 3008. 3009. 3010. 3011. 3012. 3013. 3014. 3015. 3016. 3017. 3018. 3019. 3020. 3021. 3022. 3023. 3024. 3025. 3026. 3027. 3028. 3029. 3030. 3031. 3032. 3033. 3034. 3035. 3036. 3037. 3038. 3039. 3040. 3041. 3042. 3043. 3044. 3045. 3046. 3047. 3048. 3049. 3050. 3051. 3052. 3053. 3054. 3055. 3056. 3057. 3058. 3059. 3060. 3061. 3062. 3063. 3064. 3065. 3066. 3067. 3068. 3069. 3070. 3071. 3072. 3073. 3074. 3075. 3076. 3077. 3078. 3079. 3080. 3081. 3082. 3083. 3084. 3085. 3086. 3087. 3088. 3089. 3090. 3091. 3092. 3093. 3094. 3095. 3096. 3097. 3098. 3099. 3100. 3101. 3102. 3103. 3104. 3105. 3106. 3107. 3108. 3109. 3110. 3111. 3112. 3113. 3114. 3115. 3116. 3117. 3118. 3119. 3120. 3121. 3122. 3123. 3124. 3125. 3126. 3127. 3128. 3129. 3130. 3131. 3132. 3133. 3134. 3135. 3136. 3137. 3138. 3139. 3140. 3141. 3142. 3143. 3144. 3145. 3146. 3147. 3148. 3149. 3150. 3151. 3152. 3153. 3154. 3155. 3156. 3157. 3158. 3159. 3160. 3161. 3162. 3163. 3164. 3165. 3166. 3167. 3168. 3169. 3170. 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have limited them, are nearly forty in number, are, with two or three exceptions, of American origin. The *Anacardiaceæ* have the most extended area. Of the twenty-nine genera we preserve in this series, six are peculiar to the new world and seventeen to the old, six, consequently, are common to both. Certain of them may be seen advancing as far as the north of Asia, the Cape, and New Zealand, the *Corynocarpus* and *Rhus* for example, found in Europe and at the north of China and Japan, and extending in America as far north as south. The genus *Pistachia*, so richly represented in the Mediterranean region, the Canaries, and the East, is again met with in Mexico, and we have pointed it out in the Antilles and Venezuela. *Sorindeia*, as we have limited it, inhabits the Indian Archipelago, Madagascar, tropical western Africa, Mexico, and Chili. There are species of *Smodingium*, both in Mexico<sup>1</sup> and at the Cape. In short, this series comprises nearly three hundred species, divided amongst its twenty-nine genera, and nearly a hundred of them are American. It is almost superfluous to add that the tropical species, useful either by their fruit or any other part, have followed man in all the warm regions of the globe: such as *Anacardium occidentale*, *Mangifera indica*, *Schinus Molle*, many Sumachs, etc. As much may be said of several *Spondias*, which are fruit trees, the *S. dulcis*, *purpurea*, *cytherea*, these natives of one world having in this manner passed into the other long ago.

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AFFINITIES.—They are numerous, on account of the manner in which the family has been constituted. That with the *Juglandæ* is striking as to the organs of vegetation, leaves, odour, and properties; but these plants have been separated from the *Terebinthaceæ*, principally on account of their naked male flowers, in catkins, and their female flower having inferior ovary with a basilar placenta and a single orthotropous ovule. By the *Bursereæ* the *Terebinthaceæ* are nearly confounded with the *Rutaceæ*, such as *Picramnia*, *Irvingia*, *Spathelia*, etc. It has been said,<sup>2</sup> with reason, that apart from their balsamic properties, differing in bitterness or the richness in volatile essence from the genera we have mentioned, the *Bursereæ* are not distinguished by any other technical character than the absence

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<sup>1</sup> H. Bx. in *Adangonia*, xi. 162.

<sup>2</sup> B. H. *Gen.* 321.

of scales or hairs on the staminal filaments.<sup>1</sup> The *Rutaceæ* of the series *Zanthoxyleæ*, with the carpels united in a plurilocular ovary, and which have been called *Toddaliæ*, differ from *Bursereæ* in having leaves without glandular punctuation, a diplostemonous androecium, and an exalbuminous embryo. The species of *Amyris*, which, we know, are *Rutaceæ*, were formerly connected with *Bursereæ*, again proving very close affinities. Slightly more removed from the *Bursereæ* are the *Euphorbiaceæ*, having however, like them, unisexual flowers, provided with a corolla, a diplostemonous androecium and ovary cells whose two ovules are descendent with the micropyle exterior and superior. But these *Euphorbiaceæ* are distinguished in such a case, either by the absence of a balsamic juice, or by non-compound leaves, the presence of an obturator above the micropyle, or the existence of albumen.<sup>2</sup> By the *Spondiææ* and *Anacardiææ*, this family so closely approaches the *Sapindaceæ*, that it becomes difficult to separate them distinctly when the flower of the latter is not irregular, and the disk exterior to the androecium. But the ovule of the *Anacardiææ*, with its known peculiarities, is characteristic of this group, particularly when it is supported by the ascendent funicle, of which we have seen so many examples in the description of types. The *Sapindaceæ* often have an aril, a curled embryo, and usually from two to five cells in the ovary; which does not exist in the *Anacardiææ*, and is observed on the contrary in certain *Spondiææ*. But in these the ovule is always descendent, the disk interior to the androecium, and the flowers regular. When their carpels are independent, at least mostly, as in *Buchanania* and *Spondias*, they thus become very analogous to *Sabia* and the *Connaraceæ*, but the former has petals and stamens superposed to the sepals and biovulate ovaries, the latter orthotropous and ascendent ovules, and carpels dry and generally dehiscent. There remain the numerous affinities of the *Muppiææ* and *Phytocreneæ* in the first place with the *Olacineæ*, amongst which some still range them, and which are, we think, more apparent than real, for they are always separated very distinctly<sup>3</sup> by not having the stamens opposipetalous by the placenta being parietal, biovulate, the ovary unilocular

<sup>1</sup> The diplostemonous androecium has also been mentioned as characteristic of the *Bursereæ*, but we know, that amongst them, *Trigonochlamys* is isostemonous, and that a large number of *Rutaceæ* are diplostemonous.

<sup>2</sup> These four characters are, it is true, rarely found united in any plant belonging to this family, but they are never all wanting at once.

<sup>3</sup> H. Bx. in *Adansonia*, xi, 203.

instead of central, free or more less completely axile, with as many ovules as there are cells or carpellary leaves. It is true the foliage of the *Mappiceæ*, their aspect, and mode of inflorescence, are often those of the *Olacineæ*, but these characters, without much value here, are not found in the *Phytocreneæ*, inseparable however from the *Mappiceæ*, by the flower and fruit, and with their volubile climbing stems, alternate or opposite leaves, often lobate, resembling outwardly much less still the *Olacineæ*, *Santalacæ*, or *Loranthacæ*, than the *Terebinthaceæ* themselves, recalling altogether by these characters the *Menispermaceæ*, *Sapindaceæ*, *Ampelideæ*, etc.

The *Terebinthaceæ* are woody and in general remarkable by the presence of a gummy resinous juice, often balsamic and sometimes caustic. Their latex ducts, especially studied by TRÉCET,<sup>1</sup> are situated both in the pith and bark, or in the latter only. Certain Pistachios and Sumachs have at first only one proper duct in the woody body of their root opposite the middle of each of the four to six fibro-vascular bundles. Later, others appear on two or three concentric lines, then they are anastomosed, and may even form a very rich network. According to the observer we have just named, "in the trunk of *Rhus*, *Pistacia*, *Schinus*, etc., the proper ducts of the bark are never exterior to the liber. The first appear<sup>2</sup> in the cortical bundles themselves, at very nearly the same time as the tracheæ on the inside of the bundle." The reservoirs of latex may show themselves in plants destitute of membrane, and they show moreover very varied modifications in the different species observed. Often, at the time of the fall of the leaf, the proper ducts of the base of the petiole are obstructed by the multiplication of the cells forming the walls. MARCHAND<sup>3</sup> has proved a great resemblance of organisation between the stems of the *Anacardiaceæ*<sup>4</sup> and *Bursereæ*. The latter<sup>5</sup> have the general structure of Dicotyledons, and although the reservoirs of balsamic juice are found

<sup>1</sup> In *Compt. Rend. Acad. Sc.* lxx. 17; in *Adansonia*, viii. 121.

<sup>2</sup> Often under the form of slits not filled with liquid and surrounded by large cells which frame them like a wall.

<sup>3</sup> *Anacard.* 152, t. 3.

<sup>4</sup> On the trunks of these see also: KIESER *Mém. Sur. l'Org.* (1814), t. 16, 17.—C. H. SCHULTZ, in *Nov. Act. Nat. Cur.* xviii. (1841), Suppl. ii. t. 20.—OLIV. *Stem.* in *Dicot.* 11.

<sup>5</sup> *Adansonia*, viii. 56, t. 2, 3.



in most of their organs, it may be said that they are met with especially in the bark. This in *Balsamea*,<sup>1</sup> for instance, possesses a liber zone plunged in the middle of a cellular tissue full of gummy resinous matter. There is also some in the pith. This matter may even ooze out, the first year, by slits in the epidermis and the cork. But later, as is seen in *B. Myrrha*, "the production of balm cannot take place in the herbaceous layers of preceding years, for every year it makes an exfoliation throwing back the layers previously formed." Everywhere where there is any living parenchyma the resinous substance may be produced. The exfoliation of the exterior layers of the cortical parenchyma has been followed in the *B. Africana* which gives *bdellium*; it is produced in fragments. In the *Boswellia papyrifera*, on the contrary, it is produced by large parchment-like plates giving to the trunk of this tree the same appearance as that of the Birch.<sup>2</sup> In the *Phytocreneæ* the organisation of the stems is quite exceptional; it has been compared to that of the *Menispermaceæ* and *Bignoniaceæ*. In *Phytocrene*, GRIFFITH<sup>3</sup> has pointed out what he calls enormous medullary rays, arranged symmetrically, very thick and equally spaced (nine in number in a young stem of *P. gigantea*). They are composed of elongated cells, attenuated at the summit crossed by striped ducts. The wood is very porous, formed of numerous large tubules, pierced with slits plunged in its punctate prosenchyma. There are distinct concentric zones in the wood, each having their rays independent of those of the neighbouring zone. The thick radiated lines, considered by GRIFFITH to be medullary rays, have been regarded<sup>4</sup> as belonging to the woody system, and as forming the interior portion of a second ring of wood developed outside the first.<sup>5</sup> In the *Phytocreneæ*, as in the *Mappieæ*,<sup>6</sup> the phenomena of being drawn up which show themselves so frequently in the leaves, and especially in the lateral branches, cause in consequence, at certain levels, a transverse section to show not only

<sup>1</sup> MARCH. in *Adansonia*, vii. 261, t. 8.

<sup>2</sup> The same author has observed an analogous arrangement of the balsamic substance, not only in the stems of *Pistacia*, but also in certain galls of *P. Terebinthus* (*Anacard.* 152, t. 3).

<sup>3</sup> In *Wall. Pl. As. Bar.* iii. 11, t. 216; *Icon. cccxc.*—RADLK. in *Flora* (1858), 206.—OLIV. *Stem.* in *Dicot.* 29.

<sup>4</sup> A. JUSS. *Monogr. Malpighiac.* 122.

<sup>5</sup> For the anat. of *Phytocrene*, see also: GRIFF. *Notul.* iv. 324.—TREVIR. in *Bot. Zeit.* (1847), 400; in *Ann. Nat. Hist.* sér. 2, i. 131.—LINDL. *Introd.* i. 211, fig.; *Veg. Kingd.* 271.—H. MOHL. in *Bot. Zeit.* (1855).—METTEN. *Beitr. z. Bot.* (1850), 50.

<sup>6</sup> On the structure of the branches of *Grisolia*, see H. Bx. in *Adansonia*, iv. 213.

the different zones of a perpendicular stem, but, more outwardly, the superadded sections which are those of the branches and boughs of another order.

It is particularly to the presence of gummy-resinous juices that the *Terebinthaceæ* owe their peculiar properties.<sup>1</sup> The most known are those which make Mastie, Incense, Elemi, Myrrh, Balm of Mecca, and *Bdellium*. The three latter are produced by species of the genus *Balsamea*. It was *B. Myrrha*<sup>2</sup> that was especially considered formerly to yield the Myrrh of Arabia and Abyssinia, an odorous gum resin, at first reserved for the worship of gods, sold for its weight in gold, and afterwards forming part of the most choice medicaments; mithridate, theriac, orvietan, electuary of hyacinth, the balms of Fioravanti and of the Commander, the elixir of Garus, the plaster *diabotanium*, etc. It is a balsamic stimulant, particularly useful in cases of chronic inflammation of the mucous membrane. It was formerly recommended as astringent, cordial, stomachic, deobstruent, antiseptic, diuretic, etc. It was much used in embalming. When it flows naturally from the trunk and branches it is fluid, and this form formerly bore the name of *Stucté*. By cutting into it the flow is increased, but it injures the plant, which often dies, and gives moreover in this case a product of inferior quality, and which is besides, frequently adulterated by the addition of various resinous substances of much lower value. The Myrrh of Arabia or Turkey is the *Mür* of the Hebrews, also called by the ancients *M. troglodyte*. The *M.* of India was distinct; it is said to have been gathered on the shores of the Red Sea, thence sent to India, and from thence brought to Europe. It is possible it was collected in India itself where the *B. Myrrha* also grows. There are some false Myrrhs<sup>3</sup> which must not be confounded with the preceding. *Bdellium* is still less employed in medicine than Myrrh; several sorts are noticed; the same perhaps as those formerly

<sup>1</sup> ENDL. *Enchirid.* 599, 602.—LINDL. *Veg. Kingd.* 460, 466; *Fl. Med.* 169, 281.—GUIB. *Drog. Simpl.* 6d. 6, iii. 485.—ROSENTH. *Syn. Plant. Diaphor.* 845.—MARCH. in *Adansonia*, viii. 50; *Anacard.* 139.

<sup>2</sup> *Balsamodendron Myrrha* NEES et EBERM. *Handb.* iii. 122.—NEES, *Plant. Med.* t. 357.—ROSENTH. *op. cit.* 860.—MARCH. in *Adansonia*, vii. 250, t. 8 (On the origin and production of

Myrrh). BERG believes the Myrrh is produced by an allied but different species, *B. Ehrenbergianum* (in *Bot. Zeit.* (1862), 163.—BERG et SCHMIDT, *Darst....Officin. Gew.* iv. t. 39 d.—GUIB. *loc. cit.* 311, fig. 719); but this plant does not seem specifically different from *B. Opopalsamum* K. (*Oliv. Fl. trop. Afr.* i. 326).

<sup>3</sup> BONASTRE, in *Journ. Pharm.* xv. 231.

described by DIOSCORIDES. The B. of Africa comes from Senegal and Guinea, it is furnished by the *B. africana*,<sup>1</sup> to which ADANSON gave the name of *Niottout*. According to HOOKER and MARCHAND<sup>2</sup> the origin of the two other kinds of *Bellium* is as follows: that of India comes from *B. Agallocha*,<sup>3</sup> and that of Scinde is obtained by incision from *B. Mukul*;<sup>4</sup> but these two plants are perhaps, it is said, only forms of *B. africana*, their product only being modified by the method of collection and extraction. This conclusion will not be at all extraordinary, if we admit that *B. Ehrenbergianum* yielding Myrrh is also only a form of *B. Opobalsamum*<sup>5</sup> (fig. 277-279), the tree yielding the Balm of Mecca, of Gilead, of Judea, or of Cairo; that precious perfume, in part liquid, syrupy, whitish or slightly tawny, with a very aromatic and bitter taste, cultivated, it is said, formerly in Judea, and then in Egypt, whence the tree had been transported, but where it no longer exists; it is in Arabia Felix it is actually found. The Balm of Mecca, very rare and very little used in our time, should rather, such as it is at present, take the name of turpentine or oleo-resin. The plant from which it is extracted was also formerly valued for its wood, or *Xylobalsumum*,<sup>6</sup> and its aromatic fruit, or *Carpobalsamum*,<sup>7</sup> which enters into the fabrication of theriac. Incense or Oliban,<sup>8</sup> whose true origin was so long unknown, and which was believed especially to come from India, had been, at the commencement of this century, attributed by COLEBROOKE to *Boswellia thurifera*,<sup>9</sup> an Asiatic tree not specifically different from *B. serrata*.<sup>10</sup> But the aromatic gum-resin coming from this tree,

<sup>1</sup> *Balsamodendron africanum* ARN. in *Ann. Nat. Hist.* iii. (1839), 87.—ROSENTH. *op. cit.* 862.—GUIB. *loc. cit.* 514.—H. BN. in *Dict. Encycl. Sc. Méd.* viii. 310.—OLIV. *Fl. trop. Afr.* i. 325.—*B. abyssinicum*, BERG. in *Bot. Zeit.* (1862), 161.—*B. Schemperi* BERG. *loc. cit.* 162.—*B. Kotschyi* BERG. *loc. cit.* 162.—*B. Kafal* K. ?—*B. Kafal*. A. RICH. *Fl. Abyss. Tent.* i. 149.—*Heudelotia africana* RICH. *Fl. Sen. Tent.* i. 150, t. 39.

<sup>2</sup> In *Adansonia*, vii. 379; viii. 55.

<sup>3</sup> *Balsamodendron Agallocha* WIGHT et ARN. *Prodr.* i. 174.—H. BN. in *Dict. Encycl. des Sc. Méd.* viii. 313.—*B. Roxburghii* ARN.—*Amyris Commiphora* ROXB.—*A. Agallocha* ROXB.—*Commiphora madagascariensis* JACO.

<sup>4</sup> *Balsamodendron Mukul* HOOK. F.—ROSENTH. *op. cit.* 862 (*Googul, Guggur, Mokul* of the Persians).

<sup>5</sup> K. in *Ann. Sc. Nat.* sér. 1, ii. 348.—ROSENTH. *op. cit.* 861.—MARCH. in *Adansonia*, viii. 54.—

OLIV. *Fl. trop. Afr.* i. 326.—H. BN. in *Dict. Encycl. des Sc. Méd.* viii. 311, n. 2.—*B. gileadense* K. *loc. cit.*—DC. *Prodr.* ii. 76.—BERG. in *Bot. Zeit.* (1862), 163.—*Amyris Opobalsamum* FORSK. *Æg.-Arab.* 79.—*A. gileadensis* L. *Man-tiss.* 65.—*Protium gileadense* WIGHT et ARN. *Prodr.* i. 177 (*Bechan* of the Arabs).

<sup>6</sup> P. ALP. *De Balsamo Dialog.* (1591), trad. fr. 76.—GUIB. *op. cit.* 509.

<sup>7</sup> H. BN. in *Dict. Encycl. Sc. Méd.* viii. 312.

<sup>8</sup> GUIB. *op. cit.* 515.

<sup>9</sup> In *Asiat. Res.* ix. 317; xi. 158.—ROXB. *Fl. Ind.* ii. 383.—LINDL. *Fl. Med.* 171.

<sup>10</sup> STACKH *Extr. Bruc.* 19, t. 3.—DC. *Prodr.* ii. 76, n. 3.—PEREIRA, in *Med. Gaz.* xx. 676; *Elem. Mat. Méd.* ed. 4, ii. p. ii. 379.—H. BN. in *Dict. Encycl. Sc. Méd.* x. 107. To this species is attributed the production of the substances called *Luban Maitie* and *Morh Madov*.

although it has the qualities of our incense, is nearly all consumed in its native country and never arrives in Europe, where we employ especially the *Oliban* collected on both sides of the Red Sea, in Arabia, and Abyssinia. It is said that a part of this product comes to us direct by the north of Egypt, and that the other passes by India, whence the commercial names of African Incense and Indian Incense;<sup>1</sup> the tree it flows from is the *Boswellia papyrifera*<sup>2</sup> (fig. 289-283), whose trunk, very thick at the base, is so remarkable for the exfoliation of the superficial layers of its bark in large parchment-like flakes.<sup>3</sup> Incense, which has always been burnt in temples, and whose usage seems to have been necessitated by the putrid emanations resulting from the sacrifices, was also employed for embalming, and in medicine, as astringent, detersive, diaphoretic, stimulant, diuretic, expectorant; it also formed part of several ointments, the balm of Fioravanti, of theriac, etc.

*Bursera* also yields certain oleo-resinous products, but the majority are little known and little used in Europe. *B. gummifera*<sup>4</sup> (fig. 269-274), or Gommart (Fr.) of the Antilles, furnishes a resin called American gum or chibou resin, Elemi of the Antilles, dull yellow Tacahamaque, T. of Guatemala, formerly recommended as antigonorrhœic and anthelmintic, resolvent, cephalic, applied with success to obstinate sores and ulcers. *Hedwigia balsamifera*<sup>5</sup> (fig. 284-293), very frequently, but, we think, wrongly, confounded with the preceding plant, differing from it more especially by its monopetalous corolla, has however the same properties. Its oleo-resin is also tonic, stimulant, a remedy causing sores to cicatrize. This tree is vulgarly called "Mountain Sugar Tree" and also "Pig-wood," because it was believed that the wild pigs cured, with the bark of this tree,

<sup>1</sup> MARCH. in *Adansonia*, viii. 52.

<sup>2</sup> A. RICH. *Fl. Abyss. Tent.* i. 148, t. 33.—OLIV. *Fl. trop. Afr.* i. 323.—*Amyris papyrifera* DEL. *Voy. à Méroé*, 99.—*Plesslea floribunda* ENDL. *Iconogr.* 56, t. 28 (*Makker* of the Abyss.). The *B. sacra* FLUCK. of Arabia, yielding incense, is perhaps a form.

<sup>3</sup> Incense is collected in Zanzibar, perhaps it is furnished by *Balsamea*. The *B. Zanzibarica* H. BN. (in *Adansonia*, xi. 180), yields a very aromatic stimulant resin, employed in medicine in that country, under the name of *Sandaracsi*.

<sup>4</sup> JACQ. *Amer.* 94, t. 65.—L. *Spec.* 741,—

SLOAN. *Hist.* t. 199.—CATESB. *Car.* i. t. 30.—DC. *Prodr.* ii. 78, n. 1.—TURP. in *Diet. Sc. Nat.* Atl. t. 264, 265.—LINDE. *Fl. Med.* 171.—GUIB. *op. cit.* iii. 522, fig. 720.—ROSENTH. *op. cit.* 865.—MARCH. in *Adansonia*, viii. 54.—*Elaphrium integerrimum* TUL. (*Curatero* in Colomb.). Its bark and wood are employed in New Granada as diuretic, diaphoretic, and for dropsy, poly-sarcia, etc.

<sup>5</sup> SW. *Fl. Ind. Occ.* ii. 670, t. 13.—DC. *Prodr.* ii. 80.—GUIB. *op. cit.* iii. 524.—MARCH. *loc. cit.* 54.—*Bursera balsamifera* PERS. *Euchirid.* i. 413. *Tetragastris ossea* (part.) GERTN. *Fruct.* ii. 130, t. 109.

which they tore off, the wounds given them by hunters. The *Burseras* of the Mascarene Islands, which have been named *Marignia*, such as *B. obtusifolia*<sup>1</sup> (fig. 265–268), have analogous properties. Their gum-resin bears the common name of bastard *Colophanes*; extracted principally from the bark and fruit, it remains fluid a long time, serves for the same purposes as tar, is employed for lighting, but emits much smoke and an acrid and disagreeable odour.<sup>2</sup> Among the Indian *Burseras* of the section *Protium*, we notice an edible species, *Tingulou* of the Javanese, who eat the leaves and fruit; this will be our *B. javanica*.<sup>3</sup> The American species of the section *Icica* yield the majority of the fragrant, aromatic, stimulant, resinous substances, often burning with the odour of incense, recalling by their perfume the turpentine, essence of lemon, and sometimes even nutmeg; they often bear the names of Carana, Elemi, and Tacahamaca. *B. Tacahamaca*<sup>4</sup> furnishes a Tacahamaca resin in equinoctial America. *B. Icariba*<sup>5</sup> is said to have very edible aromatic fruits. Its roots have an astringent bark, depurative, antisyphilitic; it is said to produce the Elemi of Brazil. *B. guianensis*<sup>6</sup> would be the tree yielding the incense of Cayenne, and the oily, colourless Tacamahac. The Caranas due to this genus would be the brown C. exuding from *B. Carana*,<sup>7</sup> and the white Gum-Carana extracted from the *B. altissima*,<sup>8</sup> a large tree of Cayenne, with beautiful white or reddish wood, better known under the name of Icica-Cedar, and serving for wainscoting, furniture, and small boats. The oleo-resin of *B. decandra*<sup>9</sup> (fig. 275, 276) is the *Chipa* of the Galibis. Its odour recalls that of lemon; it solidifies in yellow transparent

<sup>1</sup> See p. 260, note 3.

<sup>2</sup> "Many varieties are known, depending on the period of collection, the mode of extraction, and the age of the tree it is collected from." (MARCH. in *Adansonia*, viii. 52). In this respect it seems to be the same with this product as with those of several other *Terebinthaceæ*.

<sup>3</sup> *Protium javanicum* BURM. *Fl. Ind.* 88.—*Amyris Protium* L. *Mantiss.* 65.—RUMPH. *Herb. Amboin.* vii. t. 23, fig. 1.

<sup>4</sup> *Icica Tacahamaca* H. B. K. *Nov. Gen. et Spec.* vii. 33.—*Protium Tacahamaca* MARCH. *loc. cit.* 52.

<sup>5</sup> *Icica Icariba* DC. *Prodr.* ii. 77, n. 6.—NEES et EBERM. *Handb.* iii. 126.—LINDL. *Fl. Med.* 172.—*Amyris ambrosiaca* L. f. *Suppl.* 216?

PISON and MARCGRAF have described this tree, from which Elemi is obtained by incision; it is collected twenty-four hours after and soon becomes a dry and brittle resin.

<sup>6</sup> *Icica guianensis* AUBL. *Guian.* t. 131.—DC. *Prodr.* n. 3.—*I. heptaphylla* AUBL. *loc. cit.* t. 130 (ex MARCH. in *Adansonia*, viii. 52).—HANC. in *Med. Gaz.* xx. 96.—*Amyris ambrosiaca* W. *Spec.* ii. 335 (*Heiawa, Aronaou*).

<sup>7</sup> H. B. K. *Nov. Gen. et Spec.* vii. 94.—*Amyris Carana* H. *Relat.* ii. 421, 435.—GUIB. *op. cit.* iii. 519.—G. PL. in *Bull. Soc. Bot. de Fr.* xv. 16.

<sup>8</sup> *Icica altissima* AUBL. *Guian.* t. 132.—*Amyris altissima* W. *Spec.* ii. 336. GUIBOUT (op. cit. ii. 397) thinks this tree produces the female rosewood of Cayenne.

<sup>9</sup> AUBL. *Guian.* i. 316.—*I. pentandra* AUBL.

masses, burnt in the temples. The resin *Alouchi* or *Aracouchili*, obtained by incision in Guiana from the *B. Aracouchili*,<sup>1</sup> is kept fluid for a longer time; a balm is prepared from it serving for the treatment of sores, and also employed as a cosmetic. There are a dozen species of *Iceia* cited as yielding useful products, but their specific autonomy is often far from being proved.<sup>2</sup> The *Canariums* of the old world are in the same case. *C. mauritianum*<sup>3</sup> furnishes a resin with an odour of turpentine and camphor, the bastard Colophane of Madagascar; the Gum Carana of Amboyna is attributed to *C. Sylvestre*;<sup>4</sup> the resin of New Guinea with the odour of Elemi to *C. zephyrinum*.<sup>5</sup> In India and Java *C. commune*,<sup>6</sup> whose green fruits are purgative, gives by incision an oleo-resinous<sup>7</sup> juice having, it is said, the same properties as that of *Copaifera*. The *Garuga pinnata*<sup>8</sup> of India is used for tanning skins, as are a large number of *Anacardiæ*.<sup>9</sup> Amongst these, the Sumachs are the best known in this respect, especially the Tanning Sumach of the curriers (*Rhus coriaria*),<sup>10</sup> and the Virginian S. (*R. typhinum*).<sup>11</sup> The first grows wild in the Mediterranean region, in dry warm and stony places; its leaves reduced to powder are employed for tanning and dyeing, whilst its flattened acid and astringent fruits were formerly used as a condiment. The latter is a native of North America, but is cultivated in our parks and gardens; it is used, though less often, for the same purposes as the former. The fruit is acid and astringent,

—*I. enneandra* AURL.?—*Protium decandrum* MARCH. in *Adansonia*, viii. 51.

<sup>1</sup> AURL. *Guian.* i. 345, t. 133.—GUIB. *op. cit.* iii. 531.—LINDL. *Fl. Med.* 172.—*I. heterophylla* DC. *Prodr.* ii. 77, n. 2.—*Amyris heterophylla* W. *Spec.* ii. 335.—*Protium Aracouchili* MARCH. in *Adansonia*, viii. 51.

<sup>2</sup> ROSENTH. *op. cit.* 863–865.

<sup>3</sup> *Colophonia mauritiana* COMMERS. (ex DC. *Prodr.* ii. 79).—*Bursera paniculata* LAMK. *Diet.* ii. 768 (*Gommart paniculé*).

<sup>4</sup> GERTN. *Fruet.* ii. 99, t. 102.—DC. *Prodr.* n. 2.—*Camacoean* RUMPH. *Herb. Amboin.* ii. t. 49.

<sup>5</sup> Var. (?) du *C. commune* (DC.).—Canary *Barat* RUMPH. *loc. cit.* t. 48.

<sup>6</sup> L. *Mantiss.* 127.—DC. *Prodr.* ii. 79, n. 1.—GUIB. *op. cit.* iii. 521.—ROSENTH. *op. cit.* 866.

—LINDL. *Fl. Med.* 170.—KÆN. in *Ann. Bot.* i. 260, t. 7.—ROXB. *Fl. Ind.* iii. 137.—MARCH. *loc. cit.* 53.—*Amyris zeylanica* RETZ. *Obs.* iv. 25.

—*Balsamodendron zeylanicum* DC. *Prodr.* ii. 76.  
<sup>7</sup> This is said to be the Elemi of Eastern India. The other species of *Canarium* with

resinous juice used, are *C. bengalense* ROXB. *Pimela* KÆM. *strictum* ROXB. *Legitimum* MIQ. (*Dam-mara nigra legitima* RUMPH. *loc. cit.* t. 53). Voy. ROSENTH. *op. cit.* 866.

<sup>8</sup> ROXB. *Pl. Coromand.* iii. t. 108.

<sup>9</sup> *Elaeagnus*, joined to *Bursera* as a section, yields in Mexico and the neighbouring regions, the odoriferous stimulant Copals and Elemis, employed as medicines and perfumes. Such are: *E. elemiferum* ROYL. (*Man. Mat. Med.* 1747); *E. tomentosum* JACQ. (*Am.* 105, t. 71); —NEES et EBERM. *Handb.* iii. 130; —LINDL. *Fl. Med.* 173), which yields a Tacamahac; the *E. tomentosum* H. B. K. producing a reddish T. and the *Acetillo* of the Mexicans (*E. Acetillo* HANDB.).

<sup>10</sup> L. *Spec.* 379.—DUHAM. *Ayrb.* éd. 2, ii. t. 46.—LUDW. *Ect.* t. 122.—DC. *Prodr.* ii. 67, n. 4.—GUIB. *op. cit.* iii. 486.—GREN. et GODR. *Fl. de Fr.* i. 340 (*Roux, Corroyère, Finaigrier*).

<sup>11</sup> L. *Spec.* 380.—DUHAM. *loc. cit.* t. 47.—GUIB. *loc. cit.* 187.—MARSH. *Anacard.* 145.—ROSENTH. *op. cit.* 851.

is used in America as a refrigerative. It is especially employed for the preparation of a drink prescribed in cases of phlegmasy. From its incised bark flows a lactescent juice, soon solidifying in an acrid gum-resin called *Papaw* juice. The *R. Vernix*,<sup>1</sup> a tree from Japan, China, and India (wrongly confounded with the *Ailantus glandulosa*, under the common denomination of Japanese varnish), has also a whitish juice darkening on exposure to the air, and which, dissolved in a siccativ oil, is used to prepare a black varnish. It is said to be poisonous, like a closely allied species, native of North America, *R. venenata*,<sup>2</sup> also furnishing a varnish and a wax compared to that of *R. succedanea*.<sup>3</sup> This is well known in Japan for the wax it produces, analogous to that of bees, although softer, and used in that country for the same purposes, particularly the manufacture of candles. The berries are boiled in water and then submitted to the action of a press which extracts this kind of tallow, imported for some years past into England.<sup>4</sup> In Mexico the *R. copallinum*<sup>5</sup> has been considered to yield the Copal of that country; it gives a gum-resin, but very different from that matter, and is more known for its astringent roots, and the use made by the Indians of its leaves as tobacco, and the oil of its berries as anti-hemorrhoidal. The most dangerous species of this genus are *R. radicans*<sup>6</sup> and *Toxicodendron*<sup>7</sup> of North America, extremely acrid, contact with which, and even its exhalations, produce, in the warm season, reddening of the skin, a swelling which is sometimes considerable, and an inflammation that may be very serious. Inwardly the leaves and

<sup>1</sup> L. *Mat. Med.* 151.—THUNB. *Fl. Jap.* 121 (necal.).—*R. juglandifolium* WALL.—*R. vernici-fera* DC. *Prodr.* ii. 68, n. 20.—Sitz, *Sitz dju*, *Urus*, KÆMPF. *Amœn.* 791, ic.

<sup>2</sup> DC. *Prodr.* n. 21.—DILL. *Elth.* t. 292.—LINDL. *Fl. Med.* 284.—*R. Vernix* L. *Spec.* 380.—BIGEL *Med. Bot.* i. 96, t. 10 (*Poison Ash, Poison-wood, Poison-tree, Poison-Sumach*).

<sup>3</sup> L. *Mantiss.* 221.—THUNB. *Fl. Jap.* 121.—DC. *Prodr.* n. 19.—GUIB. *op. cit.* iii. 489.—ROSENTH. *op. cit.* 852.—*Fusi no ki* KÆMPF. *Amœn.* 794, ic.

<sup>4</sup> It is possible that certain species allied to this one, are also used in Japan for the extraction of an analogous wax.

<sup>5</sup> L. *Spec.* 380.—JACQ. *Hort. Schœnbr.* t. 341.—DC. *Prodr.* n. 14.—ROSENTH. *op. cit.* 851.

<sup>6</sup> L. *Spec.* 381.—DC. *Prodr.* n. 25.—BIGEL.

*Med. Bot.* iii. t. 42.—GUIB. *loc. cit.* 487.—DUHAM. *Arbr.* éd. 2, ii. t. 48.—*Bot. Mag.* t. 1806.—NEES, *Pl. Med.* iii. t. 354.—*Toxicodendron vulgare* MILL.—*T. volubile* MILL. (*Lierre du Canada*).

<sup>7</sup> L. *Spec.* 381. MICHX. *Fl. Bor.-Amer.* i. 182.—PURSH, *Fl. Bor.-Amer.* i. 205.—DC. *Prodr.* n. 26.—BULL. *Pl. Vén.* 334.—GUIB. *op. cit.* 488, fig. 702.—PEREIRA, *Elem. Mat. Med.* ed. 4, ii. p. ii. 377.—LINDL. *Fl. Med.* 285.—NEES, *Pl. Med.* iii. t. 853.—RÉV. in *Bot. Méd. du xix<sup>e</sup> Siècle*, iii. 359.—MOQ. *Bot. Méd.* 450.—BERG. et SCHMIDT, *Darst. Off. Gew.* t. 16 d.—ROSENTH. *op. cit.* 852.—*Toxicodendron pubescens* MILL. (*Trailing poison Oak* des Amér. *Arbre à la gale, à la puce, à-poison*). Perhaps a variety of the preceding species.

bark are extremely irritant and poisonous; applied to the eyes they cause violent ophthalmia. It was thought possible to utilise these powerful properties in therapeutics. The leaves have been applied topically to the skin to modify chronic cutaneous affections, eruptions, and warts, and an alcoholic tincture has been employed as an eye-salve in cases of ophthalmia. These medicines have been given inwardly for paralysis, gouty affections, and rheumatism.<sup>1</sup> The two closely allied species contain a gummy resinous juice which quickly solidifies, blackens, and stains the skin brown.<sup>2</sup> *R. Metopium*,<sup>3</sup> a species from the Antilles, has an astringent bark, recommended for diarrhoeic, hemorrhoidal, scrofulous, and venereal affections. It yields by incision a gum-resin called *Doctor-gum*, used internally as an evacuant in syphilitic affections, diseases of the bladder and liver, and externally for the treatment of sores. The leaves have been prescribed topically for malignant pustule, and inwardly as astringent. *R. colinus*<sup>4</sup> (fig. 310-313), or European Fustic,<sup>5</sup> growing in the south, from the west of Spain to the base of the Caucasus, has been recommended as a febrifuge; its bitter bark has been proposed as a substitute for chincona. The leaves are used to make gargles in cases of buccal and pharyngeal ulcerations, but it is especially an industrial plant. The wood with a brownish and greenish heart is valued in cabinet-work, and the tincture is used to dye stuffs and morocco orange yellow; it is mixed with cochineal or Prussian blue to obtain chamois or green tones. Its leaves are used also for tanning skins. Many other Sumachs<sup>6</sup> are employed in different parts of the world. Several Chinese and Japanese species,

<sup>1</sup> MÉR. et DEL. *Dict. Mat. Méd.* vi. 78.

<sup>2</sup> They contain, besides the gum-resin, a glycoside called *corianmyrtine*. *Collinsonia canadensis* and *Verbena urticifolia* are pointed out as their antidotes.

<sup>3</sup> L. AMON. v. 395.—SLOAN. *Hist.* ii. t. 199, fig. 5.—DC. *Prodr.* n. 2.—DESC. *Fl. Méd. des Ant.* ii. 49.—MARCH. *Anacard.* 144.

<sup>4</sup> L. SPEC. 383.—JACQ. *Fl. Austr.* t. 238.—GREN. et GODR. *Fl. de Fr.* i. 340.—GUIN. *op. cit.* iii. 488.—*Cotinus coccinea* DON. *Pompt.* 780.—T. *Inst.* 610, t. 350.—C. *Coggygia* SCOP. *Fl. Corn.* ed. 2, n. 368.—MENCH. *Meth.* 73.

<sup>5</sup> FUSTIC, *Coquesigue*, *Arbre à perruques*.

<sup>6</sup> Particularly *R. serratum* and *R. integrifolium* (sect. *Styphonia*), species from North America, yielding a stimulant resin; *R. pupi-*

*gerum* BL. which, in Java and Japan, yields wax; the *R. Chinense*, whose berries furnish oil; the *R. elegans* AIR. whose leaves are smoked with tobacco in Mexico, and whose sourish and sharp berries are used as a condiment; the *R. lævigatum* L. and *riminale* VAHT, from the Cape, used for wheelwrights' work; *R. striatum* R. and PAV. from Peru, dyeing species (yellow); the *R. oxyacantha* SCHOUSB. or *Hjedari*, from Morocco, used for dyeing silk stuffs black; *R. albidum* SCHOUSB. and *pentaphyllum* DESF. of northern Africa, whose fruits are edible, and eaten as condiments; *R. suaveolens* AIR. used in the United States for dyeing orange yellow; *R. Thunbergii* HOOK. a species from the Cape, yielding cabinet wood, etc. (See ROSENTH. *op. cit.* 849, 1155).



particularly *R. semialata*<sup>1</sup> and *japonica* SIEB. produce under the influence of the puncture of the plant-louse, false galls, called China galls, or *Ou-poey-tse*,<sup>2</sup> which for some years past have been brought in abundance to Europe, and, being rich in tannin, are sought after in commerce, and might be used in medicine for the same purposes as catechus, gambirs, etc.; they seem to result from the monstrous development of an irritated bud, and take variable forms—a hollow club, a fan, an elk horn, etc. Their nearly coriaceous translucent wall is usually covered externally with a velvet-like down, and inwardly with a large layer of cretaceous appearance containing the remains of insects. The Pistachias are the best known by us of the useful *Anacardiæ*, principally the true *P. the P. lenticus* and *Terebinthus*.<sup>3</sup> To this last ought perhaps to be attached as a variety of *P. atlantica*,<sup>4</sup> the species being particularly celebrated for the production of the *Terebinthus* of Chios. It is also from this island that the most esteemed turpentine comes. In the living tree, growing spontaneously in the Levant, and as much north as south of the mediterranean region, it is a resinous juice exuding during the warm season from the clefts of the bark; but a much more abundant product is obtained by making incisions in the spring; and the substance collected and thickened on flat stones placed round the foot of the tree, is gathered in the morning, during the whole summer. This turpentine, greyish or greenish yellow, having but little odour when exposed to the air, with a perfumed savour, is rare and dear, for the largest *Terebinthus* only yields small quantities each year (from half a pound to a pound); it has the general properties of this kind of oleo-resins, being aromatic, stimulant, astringent, vulnerary, diuretic; it forms part of theriac. Solidified by contact with the air, and that often on the bark of the tree, it constitutes the hard *Terebinth* resin used as a masticatory in the East. The same tree produces accidentally

<sup>1</sup> Murr. *Comm. Geett.* vi. 27, t. 3.—*R. Amela* Don, *Prodr. Fl. Nepal.* 248?

<sup>2</sup> Guib. *op. cit.* iii. 501, fig. 712-717. DECAINE has wrongly ascribed these galls to *Destylisum recemosum* of Japan.

<sup>3</sup> *Pistacia Terebinthus* L. *Spec.* 1455.—DUHAM, *Abr.* éd. 1, ii. t. 87.—BLACKW. *Herb.* t. 478.—DC. *Prodr.* ii. 64, n. 2.—MÉR. et DEL. *Diet. Mat. Méd.* v. 351.—ENDL. *Enchirid.* 600.—Guib. *Drog. Simpl.* éd. 6, iii. 496.—LINDL. *Fl. Med.* 288; *Veg. Kingd.* 466.—A. RICH. *Elém.* éd. 4, ii. 339.—NEES, *Pl. Med.* iii. t. 352.—PEREIRA, *Elem. Mat. Med.* ed. 4, ii. p. ii. 375,

fig. 69.—MOQ. *Bot. Méd.* 357.—ROSENTH. *Syn. Plant. Diaph.* 846.—MARCH. *Anacard.* 101, 146, t. 3.—*P. Khinjuk* STOCK, in Hook. *Kew Journ.* iv. 143 (ex MARCH.).—? *P. cabulica* STOCK, *loc. cit.*—*P. chinensis* BOE. in *Mém. Sav. Étr. Pétersb.* ii. 89.—*P. mutica* FISCH. et MEY. in *Bull. Mosc.* xii. 338 (ex MARCH. *loc. cit.* 103).—? *P. palæstina* BOISS. *Diagn. Pl. Or.* ix. t. 1 (ex MARCH.).—*Terebinthus vulgaris* CUP. *H. Cath.* t. 110.

<sup>4</sup> DESF. *Fl. Atl.* ii. 364.—DC. *Prodr.* n. 3.—Guib. *op. cit.* iii. 496.—LINDL. *Veg. Kingd.* 465, fig. 324.—ROSENTH. *Syn. Plant. Diaphor.* 847.

the *Caroub* of Judea, or Apples of Sodom,<sup>1</sup> that is to say, false galls, rich at the same time in tannin and gum-resin, which have been employed as stimulant in cases of chronic bronchitis and cystitis, phthisis, colic, etc. The bark of *Terebinthus* is astringent; the pericarp acid and bitter; the embryo oily. This oil is employed with friction for rheumatic pains; a sort of bread is said to be made from the seeds. The Mastie-tree (*P. Lentiscus*<sup>2</sup>), distinguished at once from the *P. Terebinthus* by its persistent pinnate leaves, is also a beautiful tree of the mediterranean region; it grows not only wild but is also cultivated in the East, and especially in the Isle of Scio, where Mastie is extracted. For this, numerous incisions of little depth are made in the bark of the trunk and large branches. Large drops of a pale yellow juice flow from them and harden, the smaller remain spherical, the larger flatten and become more or less irregular. In commerce, friction renders their surface mealy, they have a vitreous fracture, a sweet odour, an aromatic taste. They soften in the mouth and constitute a choice masticatory, considered to strengthen the gums, perfume the breath, and facilitate digestion. It is burnt in Turkey as a perfume, and liqueurs are flavoured and toilet waters and tooth powders prepared from it; it is recommended for tooth-ache and ear-ache, gouty and rheumatic affections, catarrh, hemoptysis, etc.<sup>3</sup> The true Pistachio<sup>4</sup> (fig. 259, 314-317) is said to be of Syrian origin. Transported thence to Italy, in the time of the Roman emperors, it has since become naturalised in nearly the whole Mediterranean region. Although its different parts are odorous and aromatic, only its berries are employed, the Pistachios, whose greenish embryo is rich in an oil which quickly grows rancid; sufficiently agreeable to eat however, and much

<sup>1</sup> GUIB. *op. cit.* iii. 498, fig. 707-711.—MARCH. *Anacard.* t. 3, fig. 4-6. It is a plant-house, the *Aphis Pistaciæ*, which causes their production.

<sup>2</sup> L. *Spec.* 1455.—BLACKW. *Herb.* t. 195.—DUHAM. *op. cit.* iv. t. 18.—DC. *Prodr.* n. 7.—GREN. et GODR. *Fl. de Fr.* i. 339.—NEES, *Pl. Méd.* iii. t. 351.—MÉR. et DEL. *Dict. Mat. Méd.* v. 349.—PEREIRA, *Elem. Mat. Méd.* ed. 4, ii. p. ii. 376, fig. 69.—GUIB. *op. cit.* iii. 495.—A. RICH. *Elém.* éd. 4, ii. 339.—LINDL. *Fl. Méd.* 288.—ROSENTH. *op. cit.* 846.—BERG. et SCHM. *Darst. Off. Gew.* t. 27 f.—MARCH. *Anacard.* 100, 147, t.1.—*P. massiliensis* MILL. *Dict.* (ex DC.).—*P. chia* DUHAM. *Arbr.* éd. 2, iv. 72.—*Lentiscus*

*vulgaris* C. BAUH.—SIEBH. et SM. *Fl. Græc.* t. 957.—*Terebinthus Lentiscus* MÖENCH.

<sup>3</sup> It is considered to be formed of an essential oil united to the *masticine*.

<sup>4</sup> *P. vera* L. *Spec.* 1454.—BLACKW. *Herb.* t. 461.—DUHAM. *Arbr.* éd. 2, iv. t. 17.—DC. *Prodr.* n. 1.—TURP. in *Dict. Sc. Nat. Atl.* t. 260.—POIR. *Fl. Méd.* v. 273.—MÉR. et DEL. *Dict. Mat. Méd.* v. 353.—GUIB. *op. cit.* iii. 494, fig. 706.—REV. in *Fl. Méd. du xix<sup>e</sup> Siècle*, iii. 86.—GREN. et GODR. *Fl. de Fr.* i. 339.—MARCH. *Anacard.* 146.—*P. narbonensis* L. *Spec.* 1454.—*P. reticulata* W. *Spec.* iv. 751 (*P. cultivé*, *P. erat*).

employed by confectioners for preparing comfits, or as a condiment in several aliments, pies, ices, cakes, creams, and sausage meat. Green, pectoral and soothing emulsions, a syrup, and emollient, and drinks are prepared from them; they were believed to be tonic and aphrodisiacal, and for that reason formed part of certain exciting electuaries of the ancient pharmacopœia. The paste and oil of the Pistachios are also used as cosmetics. There are many other *Terebinthaceæ* whose seeds or fruit are eaten in hot countries. Those of *Corynocarpus levigatus* FORST.<sup>1</sup> are sold as edibles in New Zealand. In Madagascar they use those of *Sorindeia madagascariensis*.<sup>2</sup> The Mango, the fruit of the *Mangifera indica*<sup>3</sup> (fig. 318-320), is considered the most exquisite fruit of tropical regions.<sup>4</sup> There are many cultivated varieties, grafted with care, in the majority of the warm countries of both hemispheres, with great differences in size, colour, consistence, and flavour of the flesh of the pericarp. This is considered to be refreshing, antiscorbutic, stomachic, antidysenteric; it is prepared with sugar and brandy; wine, alcohol, and vinegar are obtained from it; it is eaten, either alone or mixed with the embryo, which is more or less astringent, sometimes bitter, sought after as antidiarrhœic and antidysenteric, anthelmintic. The leaves also are astringent, rich in tannin, used for quinsy, toothache, bronchitis, and asthma. The trunk and fruits contain an oleo-resinous matter with an acidulous flavour, employed in America as a stimulant, sudorific, antisyphilitic, and antipsoric.<sup>5</sup> In the species of *Anacardium*, principally in *A. occidentale*<sup>6</sup> (fig. 321-324), the properties of the organs of vegetation are very nearly the same; from the bark oozes a yellowish and hard resin, having almost the appearance of yellow amber, the Cashew gum (Fr. *Gomme d'Anacarde*), soluble, and used for nearly the same

<sup>1</sup> *Char. Gen.* 31, t. 16.—LAMK. *Ill.* t. 143, fig. 3.—HOOK. in *Bot. Mag.* t. 4379.—HOOK. F. *Fl. N.-Zel.* i. 48.—ROSENTH. *op. cit.* 505.—*Merretia lucida* SOLAND. MSS.

<sup>2</sup> DUP.-TH. *Gen. Nov. Madag.* 24.—DC. *Prodr.* ii. 80 (*Manguier à grappes*).

<sup>3</sup> L. *Spec.* 290.—GÆRTN. *Fruct.* ii. 96.—DC. *Prodr.* ii. 63, n. 1.—TURP. in *Diet. Sc. Nat.* Atl. t. 262.—MER. et DEL. *Diet. Mat. Méd.* iv. 216.—GUIB. *op. cit.* iii. 493.—LINDL. *Veg. Kingd.* 466; *Fl. Med.* 281.—A. RICH. *Elém.* ed. 4, ii. 342.—ROSENTH. *op. cit.* 854.—H. BN. in *Diet. Encycl. Sc. Méd.* sér. 2, iv. 506 (*Mango*, *M. cultivé*, *Apricot of Saint-Domingo*).

<sup>4</sup> Some have even gone so far as to suppose that the apple-tree of Eden was a Mango.

<sup>5</sup> Many other *Mangifera* are indicated as having the same properties. They even eat in Cochin China, notwithstanding its odour, the fruit of *M. foetida* LOUR.

<sup>6</sup> L. *Spec.* 548.—JACQ. *Amer.* i. t. 181.—DC. *Prodr.* ii. 62, n. 1.—A. S. H. in *Arch. Bot.* i. 269.—GUIB. *op. cit.* iii. 452.—LINDL. *Fl. Med.* 282.—MER. et DEL. *Diet. Mat. Méd.* i. 274.—MARCH. *Anacard.* 141.—H. BN. in *Diet. Encycl. Sc. Méd.* iv. 51.—*Cassuvium pomiferum* LAMK.—*Acajuba occidentalis* GÆRTN. (*Anacarde*, *Acajou à fruits*, *A. à pommes*).

purposes as Gum Arabic. This bark also contains much tannin, like the leaves; it is used to curry leather, and prepare astringent lotions and gargles. It is said that by drinking from a vessel whose rim has been rubbed with the leaves one becomes rapidly intoxicated. The root is considered, on the contrary, in the Antilles, to be purgative. The fruit (Cashew Nut) is hard and woody, the pericarp is not edible; it is only remarkable for the large hollows it contains filled with a purple oleaginous juice, blackening on exposure, as acrid as creosote, employed like it for toothache, reddening and burning the skin and mucous membrane, destroying warts, modifying powerfully eruptive and ulcerated surfaces, and useful to make blisters. The burnt pericarp forms a tooth-powder. The seeds are sweet; and the embryo rich in an oil employed for the preparation of loches and emulsions applied on the skin in cases of rheumatism, sprains, and burns. The cotyledons are eaten raw or fried; a sort of chocolate is made with them. The properties of *A. nanum* and *A. humile*<sup>1</sup> are the same. In all the species the most considerable portion of the fruit is the hypertrophic peduncle, usually piriform, having the parenchyma gorged with juices,<sup>2</sup> and taking the name of Cashew Apple (fig. 324). The consistence is that of a berry, the colour white, yellow, or red, according to the variety; the flavour sourish, or more or less acrid and astringent. Conserves are made from it, and particularly that famous "Fool's Confection" of HOFFMANN, whose use, it was said, gave intelligence and memory to those most destitute of them. Fermented drinks, wine, alcohol, and vinegar may be extracted from it. In Brazil it is a reputed sudorific, diuretic, and antisyphilitic, from whence its common name of Sarsaparilla of the poor. In *Semecarpus* there is also a peduncular swelling which becomes fleshy and bacciform, rising more or less high around the true pericarp, often encircling the base. With the peduncle of *S. Anacardium*,<sup>3</sup> fermented drinks and con-

<sup>1</sup> See A. S. H. *loc. cit.*

<sup>2</sup> On its mode of development, see H. BN. in *Adansonia*, xi. 162.

<sup>3</sup> L. FIL. *Suppl.* 182.—DC. *Prodr.* ii. 62.—GUIN. *op. cit.* iii. 491, fig. 704.—MARCH. *Anacard.* 148.—S. *Cassurium* SPRENG.—*Anacardium latifolium* LAMK. *Diet.* i. 139.—*A. officinarum* GÆRTN. *Fruct.* i. 192 (*Anacarde d'Orient, Noir*

*de Marais, Fève de Malac*). The Nolé apple is the fleshy peduncle of the *Rhus atra* FORST. named by VIELLARD (in *Ann. Sc. Nat.* sér. 4, xvi. 71) *S. atra*, whose roasted seeds are eaten in New Caledonia. The juice of the stalk or Nolé resin is caustic and poisonous. The apple is used to prepare a fermented drink.

serves are also made. The nut also contains an acrid, irritant, caustic juice, cleansing eruptions and ulcers, and employed as odontalgic and antisypilitic. The embryo is oily and edible. *S. Forsteni* BL. and *Cassuvium* ROXB. also have a fleshy and edible peduncle. In the *Holigarna racemosa*<sup>1</sup> of India, the receptacular portion is elevated still more around the true fruit, which contains a bitter resinous irritant juice, blackening in the light. In most *Spondie* it is the mesocarp itself which is fleshy and edible. Thus the species of *Spondias*, such as *Spondias lutea*<sup>2</sup> (fig. 260, 261), have drupes which resemble, outwardly at least, our Plums. Hence the name of American or Spanish Plums, frequently given to them. The sarcocarp is sweetish, astringent, or somewhat sour; refreshing diet drinks are made with it, also conserves. The embryo is astringent and antidiarrhœic, like the bark and root. The flowers are used for preparing aromatic infusions, prescribed for affections of the larynx and eyes. The Apple of Cytherœa is also a good and handsome fruit, that of the *Spondias dulcis*.<sup>3</sup> So also is that of the *S. purpurea*,<sup>4</sup> another Spanish plum, with aromatic and acidulate pulp, given as a syrup for diarrhœa. In several varieties the fruit has an odour and taste of turpentine; from the stalks of all a soluble gum oozes,<sup>5</sup> employed for the same purposes as that of the *Acacias*. The *Sclerocarya cafra*<sup>6</sup> and *Birrœa*<sup>7</sup> also have sweetish drupes from which fermented drinks are made. In the *Buchanania* the embryo is eaten; those of the *B. angustifolia*<sup>8</sup>

<sup>1</sup> ROXB. *Pl. Coromand.* iii. t. 282; *Fl. Ind.* ii. 80.—DC. *Prodr.* ii. 63.—LINDL. *Fl. Med.* 282.—ROSENTH. *op. cit.* 853.—*Mangifera racemosa* LAMK. *Ill.* ii. 113.

<sup>2</sup> L. *Spec.* 75.—DC. *Prodr.* ii. 75, n. 2.—MARCH. *Anacard.* 24, 151.—*S. Myrobalanus* L. *Syst.* 357 (nec JACQ.).—*S. Mombin* JACQ. *Amer.* 378 (nec L.).—*S. graveolens* MACF. *Jam.* i. 228.—*S. aurantiaca* SCHUM. et THÜNN. *Beskr.* 225.—*S. pseudo-myrobalanus* TUSS. *Fl. Ant.* iv. 97, t. 33.—*S. Microcarpa* A. RICH. *Fl. Sen. Tent.* i. 151, t. 40.—*S. dubia* A. RICH. *loc. cit.* 153.—*S. Zanzee* DON. *Gen. Syst.* ii. 79 (*Hobo, Caja; Piapia-vy, Tapan-Tapon* of the Tahitians).

<sup>3</sup> FORST. *Prodr.* 198.—ROSENTH. *op. cit.* 858.—MARCH. *Anacard.* 25, 151.—*S. Cytherœa* SONN. *Voy.* ii. t. 123.—LAMK. *Dict.* iv. 160; *Ill.* t. 384.—GERTEN. *Fruct.* ii. 101, t. 133.—*S. paniculata* ROXB.—? *S. acuminata* ROXB.—*S. Mangifera* PERS. *Syn.* i. 509.—LINDL. *Fl. Med.* 164.—*S. Amara* LAMK. *Dict.* iv. 261, n. 4.—*Cy-*

*therœa dulcis* WIGHT et ARN.—*Poupartia Mangifera* BL.—*P. dulcis* BL.—*Evia amara* COMMERS.—*E. dulcis* BL.—*Anbalam* RHEED. *Hort. Malab.* i. t. 50 (*Anra, Eey, Vy, Mombin de Malabar, Arbre de Cythère*).

<sup>4</sup> L. *Spec.* 613.—MARCH. *Anacard.* 24, 151.—*S. Mombin* L. (nec JACQ.).—*S. Myrobalanus* JACQ. (nec L.).—*S. Ciruela* TUSS. (*Ramboutan, Bastard Mombin, Plum-tree*).

<sup>5</sup> "Gum Hycaya, G. Huacare."

<sup>6</sup> SOND. in *Linnaea*, xxiii. 26; *Fl. Cap.* i. 525.—MARCH. *Anacard.* 150 (vulg. *Jacœa*).

<sup>7</sup> HOCHST. in *Flora*, xxvii. (1844), *Bes. Beil.* 1.—WALP. *Rep.* v. 418.—MARCH. *loc. cit.* 30; 150.—*Spondias Birrœa* A. RICH. *Fl. Sen. Tent.* i. 152, t. 41.—ROSENTH. *op. cit.* 858 (*Birr*). Oil is also obtained from the seeds.

<sup>8</sup> ROXB. *Cat. Calc.* 32.—DC. *Prodr.* ii. 64, n. 2.—*Mangifera axillaris* LAMK.—*Spondias simplicifolia* ROTTL.—*Lundia mangiferoides* PEUR.

(fig. 262–264) and *latifolia*<sup>1</sup> are used to make oil. *B. lancifolia*<sup>2</sup> of Bengal is said to have an acid refreshing mesocarp. All these species have an astringent, tonic, resolvent bark. That of *Gluta Benghas*<sup>3</sup> (fig. 304–307) is rich in an acrid rubefacient juice, even vesicatory, but resinous and very combustible. Hence the branches are used to make torches. In the species of *Melanorrhœa*, particularly *M. usitata*,<sup>4</sup> this resinous juice<sup>5</sup> flows in abundance from incisions made in the stalk. It is a sort of wood oil, or black varnish, acrid and caustic, considered to have properties analogous to those of the Copaiba tree, belonging to *Dipterocarpaceæ*, etc. In India and Cochin China this varnish is especially employed for industrial purposes; wood, pottery, and household utensils are coated with it. In South America the *Astronium* is very nearly as useful. The juice, called in Brazil *Guzabu preto*, is a sort of turpentine, and has all its properties; it is extracted from *A. fraxinifolium*.<sup>6</sup> In Columbia and several neighbouring countries *A. graveolens*<sup>7</sup> is analogous to this. All these trees have a choice wood. The species of *Comocladia*, *Schinus*, and *Lithræa*, whose organisation is so like that of the Sumachs, have also the same properties. An acrid odorous juice, often blackening on exposure, flows from the incisions made in them. It is caustic in *Comocladia dentata*,<sup>8</sup> *integrifolia* JACQ., and *Brasilastrum* POIR., or False Brazil Wood, American species; in the *Lithi* of Chili or *Lithræa venenosa*,<sup>9</sup> assigned by us to the genus *Sorindeia*; less so in the species of *Schinus*, especially *S. Mollé*<sup>10</sup> (fig. 296–301), having an aromatic, but not agreeable odour, due to a gum-resin found in the bark, leaves, hollows of the pericarp, etc.; it renders these parts stimulant and sudorific;

<sup>1</sup> ROXB. *loc. cit.*—ROSENTH. *op. cit.* 856.

<sup>2</sup> ROXB. *loc. cit.*—MARCH. *Anacard.* 140.

<sup>3</sup> L. *Mantiss.* 293.—DC. *Prodr.* i. 501.—ROSENTH. *op. cit.* 853.—MARCH. *Anacard.* 141.—*Stagmaria verniciflua* JACK, in *Hook. Comp. to Bot. Mag.* i. 266.—LINDL. *Fl. Med.* 286.—*Arbor vernicis* RUMPH. *Herb. Amboin.* ii. 259, t. 86 (*Kayo Rangas* of Malay).

<sup>4</sup> WALL. *Pl. As. Rav.* i. 9, t. 11.—WALP. *Rep.* v. 555.—MARCH. *Anacard.* 141.

<sup>5</sup> "Sap of Martaban, Varnish of Siam." The *M. glabra* WALL. (*loc. cit.* iii. 50, t. 283) yields an analogous product.

<sup>6</sup> SCOTT, in *Reichb. Ic. Exot.* t. 205.—ROSENTH. *op. cit.* 853.—MARCH. *Anacard.* 143.—? *Myracrodruon Urundeuva* ALLEM. *Alt. Trab. d. Comm. Sc. Expl. Bot.* i. 3, t. 1, fig. 2.

—SALDAN. *Configur. Veg. Sc.* iii. 21, t. 15 (*Aroeira, Gonçalves-alves*).

<sup>7</sup> JACQ. *Amer.* 261, t. 181, fig. 96.—DC. *Prodr.* ii. 65.—ROSENTH. *op. cit.* 853 (*Gonzales do mato des Brés.*).

<sup>8</sup> JACQ. *Amer.* 13, 173, fig. 4 (*Guao*).

<sup>9</sup> MIERS. *Trav. Chil.* ii. 529.—C. GAY. *Fl. Chil.* ii. 43.—MARCH. *Anacard.* 93.—*Rhus caustica* HOOK. et ARN. in *Beech. Voy. Bot.* i. 15, t. 7.—*Duvana pleuropogon* TURCZ.—*Laurus caustica* MOL.—*Persca caustica* SPRENG. (*Litre. Lithi*).

<sup>10</sup> L. *Spec.* 1467.—MILL. *Icon.* t. 246.—LAMK. *Ill.* t. 822.—DC. *Prodr.* ii. 74.—*Bot. Mag.* t. 3339.—LINDL. *Fl. Med.* 287.—ROSENTH. *op. cit.* 848.—MARCH. *Anacard.* 149 (*Moile, Pepper tree of Peru, of America, and of the Spaniards*).

and forms the American Mastic, the Resin of *Mulli*, *Molle*, or *Arocira*, employed as a masticatory and purgative. *S. Arocira* L. yields an analogous mastic, used to prepare baths and lotions for gout and eye-salves. The essence of *S. terebinthifolius*<sup>1</sup> is used also in Brazil for acute pains. The gum-resin of *S. dependens*<sup>2</sup> is employed for gout, syphilis, and ulcers. The fruits have a less disagreeable flavour than those of *S. Molle*; chika wine is prepared from them, a fermented stomachic, diuretic, and antihysterie drink. The gum which exudes, in Guiana, from several *Tapiriras*<sup>3</sup> has the same properties, as also that extracted in India from the trunk of *T. Wodier*<sup>4</sup> (fig. 302, 303); it is used for the treatment of contusions and sprains; and is even taken as food in the milk of the cocoa-nut. The bark is astringent, and is employed as a remedy for sores, gout, and dysentery. In the *Mappia*, the greater part of these properties disappear; some African species of *Mappia* (*Icecina*) are still slightly astringent. *Phytoerene* owes its name to the large quantity of watery and drinkable sap flowing from the sections of the porous stem.<sup>5</sup> The *Cardiopteris Rumphii*,<sup>6</sup> of India, and its numerous Asiatic varieties, are also employed for rheumatic affections. By a singular exception, these plants have oleraceous leaves, almost insipid. Many *Terebinthaceæ* have wood useful in cabinet-work,<sup>7</sup> particularly the Sumachs.<sup>8</sup> That of several Pistachios is very beautiful, less so however than that of *Comocladia integrifolia*, which resembles mahogany; that of the Mango is yellowish.<sup>9</sup> This tree is cultivated in our greenhouses, as is also *Anacardium occidentale*. Our gardens are adorned by several Sumachs, with magnificent foliage, which often takes a brilliant red tint in autumn.

<sup>1</sup> RADDI, ex ROSENTH. *op. cit.* 849. There are also mentioned as species with analogous qualities *S. rhoifolius*, *mucronulatus*, *antarthriticus* MART.

<sup>2</sup> MARCH. *Anacard.* 150.—*Durana dependens* DC. *Prodr.* ii. 74.—ROSENTH. *op. cit.* 849.—*Amyris polygama* CAV. *IC.* iii. 30, t. 239.—*Schinus dependens* ORTEG. *Dec.* viii. 102 (*Huig-han*).

<sup>3</sup> MARCH. *Anacard.* 40, 150.

<sup>4</sup> MARCH. *op. cit.* 150.—*Odina Wodier* RONN. *Fl. Ind.* ii. 293.—ROYL. *III. Himal.* 130, t. 31, fig. 2.—ROSENTH. *op. cit.* 838.

<sup>5</sup> Especially in the *P. palmata* WALL. *macrophylla* BL. and *gigantea* WALL.

<sup>6</sup> H. BN. in *Adansonia*, x. 280; in *DC. Prodr.*

xvii. 26.—*C. moluccana* BL.—*C. subhamata* WALL.—*C. lobata* R. BR.—*Olus sanguinis* RUMPH. *Herb. Amboin.* v. 482, t. 180.—*Dioscorea sativa* L. *Amoen.* iv. 133.—*Sioja sanguinaria* HAM.—*Peripterygium quinquelobum* HASSK. (*Utta-lata*, *Uttatuer*, Amboin.; *Ulge-jabba*, *Mata-matta*, Macass.; *Gambas-Kawong*, Sund.).

<sup>7</sup> MARCH. *Anacard.* 139.

<sup>8</sup> Such as *Rhus glabra*, *radicans*, *lucida*, *glauca* (with yellow wood), *coriaria*, *rubra*, *tomentosa* (with red wood).

<sup>9</sup> In New Caledonia, *Anisomallum clusiofolium* (fig. 329), a very large and beautiful tree, yielding, it is said, an excellent building wood.

## GENERA.

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### I. SPONDIEÆ.

1. **Spondias** L.—Flowers hermaphrodite or polygamous; receptacle depressed conical. Calyx small, 4–5-fid. Valvate or subimbriate, deciduous. Petals 4, 5, alternate, longer, subvalvate, patent. Stamens 8–10, 2-seriate; filaments free, inserted below crenulate or lobate hypogynous disk; anthers introrse, 2-rimose. Carpels of superior gynæceum, 4, 5, or more rarely 6–15, sometimes 2, 3 (*Poupartia*); germens nearly free from base or more or less high connate; style same in number, free connivent stigmatiferous at apex; ovule in cell 1, descendent; micropyle at first introrse superior. Fruit drupaceous; putamen ligneous and bony, outwardly glabrous or echinate, foraminate at apex; cells 1–5 or more rarely 6–15, erect or divergent (*Cytheræa*); seeds descendent; cotyledons of exalbuminous embryo fleshy plano-convex; radicle short superior. —Trees; leaves alternate usually collected at summit of twigs; imparipinnate; folioles opposite; flowers collected in terminal much ramified compound cymiferous patent racemes.

2. **Buchanania** Roxb.—Flowers hermaphrodite; valvate teeth or lobes of short gamophyllous calyx afterwards not touching. Petals 5, imbricated. Stamens 10, 2-seriate inserted below thick orbicular, entire or 5-crenate disk; filaments free; anthers introrse, 2-rimose. Carpels of gynæceum 5, oppositipetalous free; one fertile in each, 1-locular; ovule suspended from summit of basilar funicle with superior micropyle; rather more acute or truncate apex of erect style thicker in fertile carpel. Drupe small scantily fleshy; putamen crustaceous or bony more or less late 2-valved; seed unequally



gibbous; cotyledons of exalbuminous embryo thick; radicle short superior.—Trees; leaves alternate simple entire coriaceous; flowers in racemes (paniculate) racemose-composite cymiferous. (*Trop. Asia and Oceania.*) See p. 259.

3. **Sclerocarya** HOCHST.—Flowers polygamous, 4-merous or rarely 5-merous; sepals (coloured) and petals alternate longer much imbricated. Stamens in male flower 8–15, inserted below thick central disk subequally-4-lobed; filaments free; anthers introrse, 2-rimose; in female flower 5–15, all or partly antherless. Germen free, 2–3-locular; styles 2, 3 distant at base, short thick, peltate stigmatiferous at apex; ovule in cell solitary descendent; micropyle introrse superior. Fruit drupaceous; putamen thick hard, 2–3-locular. Seeds in cells solitary or 0, descendent; cotyledons of exalbuminous embryo oblong plano-convex.—Trees or shrubs; leaves alternate; petiole long slender; flowers in spicate axillary glomerules. (*Trop. South Africa, East and West.*) See p. 259.

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## II. BURSERÆ.

4. **Bursera** L.—Flowers hermaphrodite or polygamous, 4–6-merous; calyx lobed or partite, imbricated. Petals 4–6, longer, valvate, afterwards patent, finally reflexed. Stamens twice as numerous as petals, inserted below hypogynous annular-crenate or lobed disk; filaments free; anthers (effete in female flower) introrse 2-rimose. Germen free (in male flower rudimentary), 2–6-locular; style branches same in number rather thicker reflexed, inwardly stigmatiferous at apex. Ovules in cells 2-nate, descendent, usually collateral, more or less completely anatropous; micropyle extrorse superior. Drupe ovoid or globose, usually apiculate; exocarp evalved or 2–6-valved; pyrenas 1–6, adnate to interior of ligneous or fleshy columella (whence free or adherent), usually 1-spermous. Seeds plano-convex or sub-3-agonal; cotyledons of exalbuminous embryo entire, lobed or 3-fid, contortuplicate or sometimes hippocrepiform; radicle short superior.—Balsamic trees; leaves alternate scanty or crowded at summit of twigs, deciduous or perennial, imparipinnate or more rarely 1–3-foliolate; folioles opposite entire

or serrate often coriaceous pellucid-punctuate; rachis simple or winged; flowers crowded in lateral or axillary racemes more or less ramified cymiferous. (*All trop. regions.*) See p. 260.

5? **Crepidospermum** Hook. F.<sup>1</sup>—Flowers polygamous-dioecious (nearly of *Bursera*); calyx small, 5-dentate. Petals 5, longer, valvate, incurved at apex. Stamens 5, alternipetalous, inserted below thick pulvinate disk; filaments free; anthers oblong introrse. Germen rudimentary thin subulate. Female flower? Fruit drupaceous,<sup>2</sup> compressed-subquadrate apiculate; pyrenas 1-3, chartaceous and crustaceous; seeds 1, 2, descendent; others usually abortive very small; cotyledons of exalbuminous horseshoe-shaped embryo oblong uncinat-incurved; radicle short superior.—A balsamic shrub; branches elongate-sarmentaceous; twigs, leaves and inflorescence pubescent; leaves alternate imparipinnate; folioles petiolate serrate acuminate; axillary inflorescence of *Bursera*. (*East Peru*.<sup>4</sup>)

6. **Balsamea** GLED.<sup>5</sup>—Flowers polygamous (nearly of *Bursera*) rarely 5-6-merous, very often 4-merous; calyx cupular or urceolar dentate, valvate, persistent. Petals elongate erect or patent at apex, valvate or induplicate. Stamens 2-seriate, twice as numerous as the stamens sub-hypogynously or much oftener slightly perigynously inserted with them on margin of usually rather concave receptacle; filaments free, more or less dilated at base; the oppositipetalous shorter; anthers introrse, 2-rimose (effete in female flower). Germen free (rudimentary in male flower), inserted on summit of depressed disk; germen 3- or oftener 2-locular; style short, stigmatiferous obtusely 3-4-lobed at apex; ovules in cell 2, collaterally descendent; micropyle extrorse superior. Drupe; exocarp 2-6-valved; pyrenas 1-4, 1-spermous; cotyledons of exalbuminous embryo

<sup>1</sup> Gen. 325, n. 10.—MARCH. in *Adansonia*, viii. 65.

<sup>2</sup> Purple, rather large.

<sup>3</sup> Virescent.

<sup>4</sup> Spec. 1 *C. Sprucei* Hook. F. loc. cit.

<sup>5</sup> In *Berl. Verhandl.* iii. (1782), 127, t. 3, fig. 2. (The name best founded according to the laws of nomenclature and therefore rightly preferred.)—*Commiphora* Jacq. *Hort. Schænbr.* ii. (1797), 66, t. 249.—ENDL. Gen. n. 6881.—*Balsamodendrum* K. in *Ann. Sc. Nat.* sér. 1, ii. 348 (1824).—DC. *Prodr.* ii. 76 (*Balsamodendron*).—SPACH. *Suit.*

à *Duffon*, ii. 235.—ENDL. Gen. n. 5930.—O. BERG. in *Bot. Zeit.* (1862), 152.—B. H. Gen. 323, 993, n. 4.—MARCH. in *Adansonia*, viii. 34, 67, t. 2, 5.—*Protium* WIGHT et ARN. *Prodr.* i. (1834), 176 (nec BURM.).—B. H. Gen. 323, n. 5.—*Hemprichia* EHRENB. in *Linnea*, iv. 396.—B. H. Gen. 327, n. 18.—MARCH. in *Adansonia*, viii. 69.—*Heudelotia* A. RICH. *Fl. Sen. Tent.* i. 150, t. 39.—*Protionopsis* BL. *Mus. Lugd.-Bat.* i. 229, not.—*Hitzeria* KL. in *Pet. Mossamb. Bot.* 89.—B. H. Gen. 427, n. 39.—*Balsamophloeos* O. BERG. loc. cit. 163.

membranous contortuplicate; radicle short superior.—Trees or balsamic shrubs; branches often spinescent; leaves alternate, 1–3-foliate or imparipinnate; folioles entire or serrate; flowers axillary or lateral, shortly or long racemose; racemes sometimes fasciculate, cymiferous, more or less ramified and composite. (*South West. and Tropical Cont. and ins. East. Asia.*<sup>1</sup>)

7? **Dasycarya** LIEBM.<sup>2</sup>.—Flowers polygamous; receptacle shortly cupular, clothed inwardly with disk 10-crenate at margin annular clasping base of germen. Sepals 5, free or scarcely connate at base, valvate, persistent. Petals 5, alternate, longer, induplicate-valvate or scarcely imbricated. Stamens 10, 2-seriate verticillate; filaments exterior to disk free; alternipetalous slightly longer; anthers introrse, 2-rimose. Germen (rudimentary in male flower) free; style short, stigmatiferous at apex, 3–5-lobed; cells 2-ovulate; ovules collaterally descendent incompletely anatropous subfalcate; micropyle extrorse superior. Drupe scantily fleshy rather villose; putamen usually 3-locular; seeds in cells 1–3 solitary; radicle of exalbuminous rather thick embryo superior inflexed.—A tree grey or tawny-haired; leaves alternate collected at summit of twigs imparipinnate; folioles opposite, very shortly petiolulate, entire acuminate; flowers in axillary slender alternately cymiferous spikes. (*Mexico.*<sup>3</sup>)

8? **Paiveusea** WELW.<sup>4</sup>.—Flowers diœcious apetalous; male calyx minutely oblique or gibbous, unequally 6–8-lobed, imbricated. Stamens 6–8, inserted round crenate disk; filaments free thin; anthers basifixed short; cells 2-laterally rimose. Female calyx larger than male. Germen free, 2-locular, surrounded at base by six staminodes ciliate hypogynous, sometimes connate in ring; branches of short style 2, reniform stigmatiferous at apex; ovules in cells 2-nate descendent; micropyle extrorse superior.<sup>5</sup> Fruit (immature) stipate by

<sup>1</sup> Spec. about 15, FORSK. *Descr. Æg.-Arab.* 79 (*Amyris*).—ROXB. *Fl. Ind.* ii. 244 (*Amyris*).—ARN. in *Ann. Nat. Hist.* iii. 87.—HARV. et SOND. *Fl. Cap.* i. 526 (*Balsamodendron*).—KOTSCH. et PEYR. in *Pl. Tim.* ii. t. 5, B.—HOOK. F. in *Hook. Kew Journ.* i. 259, t. 8, 9.—SCHWEINF. *Beitr. Fl. Æth.* i. 30.—OLIV. *Fl. Trop. Afr.* i. 324 (*Balsamodendron*), 328 (*Hemprichia*), 450 (*Hitzeria*).—H. BN. in *Adansonia*, xi. 180.—WALP. *Rep.* i. 557 (*Protium*), 558

(*Balsamodendron*); ii. 830; *Ann.* ii. 289 (*Balsamodendron*); vii. 546 (*Balsamodendron*), 547 (*Balsamophytos*), 648 (*Hitzeria*).

<sup>2</sup> In *Vidensk. Meddel. Kjøbenh.* (1853), 98.—B. H. *Gen.* 427, n. 38.—MARCH. *Anacard.* 160.

<sup>3</sup> Spec. 1. *D. grisea* LIEBM. *loc. cit.*—WALP. *Ann.* iv. 447.

<sup>4</sup> In *Trans. Linn. Soc.* xxvii. 20, t. 7.—B. H. *Gen.* 993, n. 5 a.

<sup>5</sup> Obturated?

elongated 3-bracteate peduncle and persistent calyx, ovoid, longitudinally 2-costulate; epicarp coriaceous, 2-valved; putamen chartaceous, incompletely 2-locular; seeds descendent; cotyledons of exalbuminous embryo straight flat;<sup>1</sup> radicle short superior.—A small tree; coma loose; branches tuberculate cicatrised; leaves at summit of twigs, alternate petiolate, digitate-3-7-foliolate; flowers (small) axillary; male crowded cymose-fasciculate; cymes contracted in dense bracteate involucrate capitules; female sub-solitary at external side 3-bracteolate.<sup>2</sup> (*Angola*.<sup>3</sup>)

9. *Boswellia* ROXB.<sup>4</sup>—Flowers hermaphrodite, 5-merous; calyx gamophyllous, imbricated, 5-dentate. Petals longer, imbricated, finally very patent. Stamens 10, subhypogynously inserted below annular crenate disk, 2-seriate; filaments free; anthers introrse, 2-rimose. Germen sessile, 2- or oftener 3-locular; style short, stigmatiferous capitate at apex, 2-3-lobed; ovules collateral 2 (of *Bursera*). Drupe 2- or oftener 3-agonal; angles obtuse shortly prominent of thick wing-shaped (*Triomma*; <sup>5</sup>) exocarp finally 2-3-valved; pyrenas 2, 3, afterwards naked, inserted in central angle of wing, finally solute. Seeds solitary in pyrenas compresso-marginate; cotyledons of exalbuminous embryo, contortuplicate multifid. Balsamic trees; leaves alternate imparipinnate, often collected at summit of twigs, deciduous; flowers in terminal or axillary racemes, sparsely or richly composite-ramified. (*South West. Asia, Malucca, Trop. Northern Africa*.<sup>6</sup>)

10. *Canarium* L.<sup>7</sup>—Flowers hermaphrodite or polygamous (nearly of *Balsamea*), usually 3-, more rarely 4, 5-merous; concave recep-

<sup>1</sup> "Viridibus."

<sup>2</sup> A genus, whose place is very uncertain, from description seeming to be nearly allied to the *Euphorbiaceae*.

<sup>3</sup> Spec. 1, *P. dactylophylla* WELW. loc. cit.—OLIV. *Fl. Trop. Afr.* i. 328.

<sup>4</sup> *Pl. Coromand.* iii. 4, t. 207.—K. in *Ann. Sc. Nat.* sér. 1, ii. 350.—DC. *Prodr.* ii. 78.—SPACH. *Suit. à Buffon*, ii. 233.—ENDL. *Gen.* n. 5928.—B. H. *Gen.* 322, n. 1.—MARCH. in *Adansonia*, viii. 23, 62.—*Libanus* COLEBR. in *As. Res.* ix. 377, t. 5, fig. 1.—*Placstea* ENDL. *Nov. Stirp.* Dec. 39, n. 47; *Icon.* t. 119, 120; *Gen.* n. 5628.

<sup>5</sup> HOOK. F. in *Trans. Linn. Soc.* xxiii. 171.—B. H. *Gen.* 323, n. 2.

<sup>6</sup> Spec. 4, 5, WIGHT et ARN. *Prodr.* i. 174.—

A. RICH. *Fl. Abyss. Tent.* i. 148, t. 33.—OLIV. *Fl. Trop. Afr.* i. 323.—WALP. *Rep.* i. 557; ii. 830; v. 419; *Ann.* ii. 288; vii. 545.

<sup>7</sup> *Mantiss.* 127.—J. *Gen.* 370.—GÆRTN. *Fruct.* ii. 98, t. 102.—LAMK. *Diet.* i. 598; *Suppl.* ii. 72, t. 812.—KÖEN. in *Ann. Bot.* i. 306, t. 7.—K. in *Ann. Sc. Nat.* sér. 1, t. ii. 352.—DC. *Prodr.* ii. 79.—SPACH. *Suit. à Buffon*, ii. 240.—ENDL. *Gen.* n. 5936.—B. H. *Gen.* 324, n. 7.—MARCH. in *Adansonia*, viii. 25, 63.—*Pimela* LOUR. *Fl. Cochinch.* (ed. 1790), 407.—*Culophonia* COMMERS. MSS. (ex K. loc. cit.).—*Canariopsis* BL. *Mus. Lugd.-Bat.* i. 219.—*Pachylobus* DON. *Gen. Syst.* ii. 89.—*Nanari* RUMPH. ex ADANS. *Fam. des Pl.* ii. 343.

tales often urceolate, sometimes deeper saciform (*Santiria*<sup>1</sup>). Calyx equal or unequal-fid or dentate, valvate, persistent. Petals longer, perigynously inserted, rather thick or subcoriaceous, valvate or imbricated. Stamens twice as numerous as petals (or very rarely equal?) 2-seriate and perigynously inserted with perianth outside thick subentire or 6-10-crenate or lobed disk; filaments otherwise free or sometimes (*Sonchaya*<sup>2</sup>) 1-adelphous; the oppositipetalous shorter; anthers introrse, 2-rimose. Germen (in male flower rudimentary or effete) sessile free, more or less immersed in concavity of receptacle; cells 3 or more rarely 2, 4; style often short, more or less lobed, stigmatiferous at apex. Ovules in cells 2, collaterally descendent; micropyle, extrorse, superior. Drupe ovoid or depressed, sometimes sub-oblique, very often oblong-3-agonal; mesocarp sparsely fleshy; cells of osseous putamen often effete, except one. Seed descendent; testa thin, membranous; radicle of exalbuminous embryo short, superior; cotyledons contortuplicate, sometimes cut (*Santiria*).—Balsamic trees; leaves alternate, imparipinnate,<sup>3</sup> rarely 1-3-foliate; folioles opposite, coriaceous; flowers in axillary and terminal clusters composite-cymiferous racemose. (*All tropical regions of Old World*.<sup>4</sup>)

11. **Garuga** ROXB.<sup>5</sup>—Flowers polygamous, 5-merous; receptacle much concave tubular-campanulate, clothed with thin disk crenate above. Sepals valvate and petals induplicate-valvate very perigynous. Stamens 10, 2-seriate verticillate; the oppositipetalous shorter. Germen inferior adnate at base; style erect, stigmatiferous, 4-5-lobed at apex; ovules in cells 2-nate descendent; micropyle extrorse superior. Fruit drupaceous evalved; pyrenas 1-4, osseous rugose, finally solute, 1-spermous; cotyledons of exalbuminous embryo thin contortuplicate.—Tomentose trees; leaves alternate, collected at summit of twigs imparipinnate; folioles opposite, serrate; flowers crowded composite-racemose.<sup>6</sup> *Trop. Asia and Australia*.<sup>7</sup>)

<sup>1</sup> BL. Mus. Lugd.-Bat. i. 209, fig. 40.—B. H. Gen. 325, n. 8.

<sup>2</sup> MARCH. in *Adansonia*, viii. 27, 64, t. 4, bis.

<sup>3</sup> Inferior folioles sometimes representing unequal stipules.

<sup>4</sup> Spec. about 62. DELESS.  *Ic. Sel. iii. t. 56 (Cottonia)*.—THW. *Enum. Pl. Zeyl.* 79.—Miq. *Fl. Ind.-Bat.* i. p. ii. 640; Suppl. i. 525.—Oliv. *Fl. Trop. Afr.* i. 327.—BENTH. *Fl. Austral.* i. 377.—H. BN. in *Adansonia*, x. 341.—WALP. *Rep.* i. 558; ii. 830; *Ann.* ii. 291; iv. 450; vii. 547, 551 (*Canariopsis*).

<sup>5</sup> *Pl. Coromand.* iii. 5, t. 208.—DC. *Prodr.* ii.

80.—ENDL. *Gen.* n. 5938.—B. H. *Gen.* 323, n. 3.—MARCH. in *Adansonia*, viii. 33, 66.—KUNTHIA DENNST. *Hort. Malab.* iv. 33 (nec H. B. Gen.).—*S. cutinanthæ* THW. in *Hook. Journ.* viii. 267, t. 8; *Enum.* 79 (quæ *Canarium*, ex. B. H.).—*Thyrsodium* B. H. *Gen.* 323 (nec BENTH. quod. *Anacardica*, p. 326).

<sup>6</sup> A genus scarcely differing from *Canario*, except by depth of receptacle, 5-merous flowers, and structure of fruit; nearly allied to it.

<sup>7</sup> Spec. about 10. THW. *Enum. Pl. Zeyl.* 79.—BENTH. *Fl. Austral.* i. 377.—WALP. *Rep.* i. 559; *Ann.* iii. 843; vii. 546.

12. **Hedwigia** Sw.<sup>1</sup>—Flowers polygamous, 4-6-merous, or more rarely (*Trattinickia*<sup>2</sup>) 3-merous; calyx short, imbricated. Gamopetalous corolla more or less high tubular; lobes valvate, finally recurved at apex. Stamens twice as numerous as petals, 2-seriate hypogynously or slightly perigynously inserted with perianth outside annular crenate disk; filaments free; anthers introrse, 2-rimose. Germen (in male flower rudimentary) 2-5-locular; style capitate-2-5-lobed, stigmatiferous at apex. Drupe; pyrenas 2-5, with difficulty or not soluble, 1-spermous; seeds descendent; cotyledons of albuminous embryo plano-convex, rugose or contortuplicate. Other characters of *Bursera*.—Balsamic trees; leaves alternate or subopposite, imparipinnate; folioles opposite coriaceous; inflorescence terminal or axillary of *Bursera*.<sup>3</sup> (*Tropical America*.<sup>4</sup>)

### III. ANACARDIÆ.

13. **Schinus** L.—Flowers polygamous or diœcious; receptacle rather convex or depressed. Sepals 5, imbricated. Petals 5, alternate, longer, imbricated. Stamens 10, 2-seriate, verticillate, inserted below outside between the lobes of orbicular rather wide disk; filaments free; the oppositipetalous shorter; anthers introrse, 2-rimose. Germen (rudimentary in male flower) sessile, 1-3-locular; 1 cell fertile; others effete or not conspicuous; style-branches 3, inserted at summit of germen, capitellate stigmatiferous at apex; ovule ascendent from summit of funicle and more or less high inserted in lateral cell, pendulous anatropous; micropyle introrse, superior. Fruit drupaceous, subglobose; epicarp usually rather hard, glabrous; mesocarp small; putamen coriaceous or osseous, longitudinally streaked, oily or resinous. Seed descendent compressed; albumen small or 0; cotyledons of rather thick embryo, flat; radicle rather long, ascendent. Resinous, fragrant trees or small trees; leaves alternate, simple (*Duvaua*) or oftener imparipinnate; folioles sessile opposite or alternate; flowers in much

<sup>1</sup> *Fl. Ind. Occ.* ii. 670, t. xiii. (not HEDW. not MED. not HOOK.).—DC. *Prodr.* ii. 80.—SPACH, *Suit. à Buffon*, ii. 243.—ENDL. *Gen.* n. 5937.—B. H. *Gen.* 326, n. 15.—MARCH in *Adansonia*, viii. 31, 65.—*Tetragastris* (part.) GÆRTN. *Fruct.* i. 130.—*Caproylon* Tuss. *Fl. Ant.* iv. t. 30.—*Schwagrichenia* REICH. *Consp.* 147.—? *Knorrea* Moç et Sess. *Fl. Mex. in.* (ex. ENDL.).

<sup>2</sup> *W. Spec.* iv. 975 (nec PERS.).—DC. *Prodr.*

ii. 89.—ENDL. *Gen.* n. 5934.—B. H. *Gen.* 326, n. 14.—MARCH in *Adansonia*, viii. 32, 66.

<sup>3</sup> From which genus it differs much by gamopetalous corolla. It has been often confounded with it in various works.

<sup>4</sup> Spec. about 8. MART. *Nov. Gen. et Spec.* iii. 92, t. 239 (*Trattinickia*).—GRISEB. *Fl. Brit. W.-Ind.* 174.—WALP. *Rep.* i. 559; *Ann.* iv. 450.

ramified compound-cymiferous racemes, axillary or terminal. (*South America*.) See p. 266.

14. **Sorindea** DUP.-TH.<sup>1</sup>—Flowers hermaphrodite or polygamous-diœcious (nearly of *Schinus*), 4, 5-merous; lobes of lobate or dentate calyx later not contiguous. Petals longer, valvate. Stamens 4, 5, alternipetalous (in female flower sterile) or in male flower 8–20, inserted from base to middle of annular, or cupular thick disk; filaments free unequal subulate; anthers introrse, 2-rimose. Germen free (in male flower minute or 0), 1-locular; style thick, stigmatiferous 3-lobed at apex; ovule subbasilar or laterally inserted, suspended from summit of funicle, and more or less high aduate to walls of germen (*Mauria*<sup>2</sup>); micropyle superior, usually more or less obturated from dilatation of summit of funicle. Drupe more or less compressed; endocarp chartaceous or filamentose; embryo of inverse seeds exalbuminous; cotyledons thick-fleshy; radicle superior.—Trees or small trees; leaves alternate, simple or oftener pinnate, flowers<sup>3</sup> in compound axillary and terminal racemes. (*Trop. America, Africa, and Oceania*.<sup>4</sup>)

15. **Solenocarpus** WIGHT & ARN.<sup>5</sup>—Flowers nearly of (*Sorindeia*) hermaphrodite, 5-merous; calyx dentate, imbricated. Petals 5, valvate. Stamens 10, 2-seriate, inserted below disk. Germen 1-locular; style simple thickly clavate, oblique truncate stigmatiferous at apex; ovule descendent nearly from apex of cell; micropyle superior. Drupe oblique oblong truncate; mesocarp oily; putamen bony; seed linear; cotyledons of exalbuminous fleshy embryo, linear; radicle superior short.—A tree; leaves alternate imparipinnate collected at summit of twigs; folioles opposite; terminal inflorescence and other characters of *Sorindeia*.<sup>6</sup> (*Eastern India*.<sup>7</sup>)

<sup>1</sup> DUP.-TH. *Gen. Nov. Madag.* 23.—K. in *Ann. Sc. Nat.* sér. 1, ii. 342.—DC. *Prodr.* ii. 80.—SPACH, *Suit. à Buffon*, ii. 245.—ENDL. *Gen.* n. 5895.—B. H. *Gen.* 419, n. 4.—MARCH. *Anacard.* 42, 167.—*Dupuisia* RICH. GUILL. et PERR. *Fl. Sen. Tent.* i. 148, t. 38.—ENDL. *Gen.* n. 5894.—*Euroschinus* HOOK. F. *Gen.* 422, n. 16.—*Trichoscypha* HOOK. F. *op. cit.* 423, n. 21 (ex MARCH.).

<sup>2</sup> K. in *Ann. Sc. Nat.* sér. 1, ii. 338.—DC. *Prodr.* ii. 73.—ENDL. *Gen.* n. 5903.—MARCH. *loc. cit.* 46.—B. H. *Gen.* 426, n. 34.—*Lithræa* MIERS, *Trav. Chil.* ii. 529.—ENDL. *Gen.* n. 5904 (part.).—B. H. *Gen.* 418 (*Rhus*).—MARCH. *loc. cit.* 93, 184.

<sup>3</sup> Small, white, yellow or purplish.

<sup>4</sup> Spec. about 25. H. B. K. *Nov. Gen. et Spec.*

vii. 11, t. 605, 606 (*Mauria*).—WIGHT et ARN. *Prodr.* i. 170.—HOOK. *Bot. Misc.* iii. 175.—TR. et PL. in *Ann. Sc. Nat.* sér. 5, xiv. 290 (*Mauria*).—TORR. in *Emor. Rep. Bot.* t. 7 (*Lithræa*).—OLIG. *Fl. trop. Afr.* i. 439, 444 (*Trichoscypha*).—BENTH. *Fl. Austral.* i. 490 (*Euroschinus*).—WALP. *Rep.* i. 411, 413 (*Mauria*) 550; v. 411, 412; *Ann.* i. 199 (*Mauria*); ii. 280; iv. 446 (*Mauria*).

<sup>5</sup> *Prodr.* 171.—ENDL. *Gen.* n. 5900.—B. H. *Gen.* 422, n. 19.—MARCH. *Anacard.* 116, 192.

<sup>6</sup> A genus allied to *Sorindeia*, having the same perianth and sometimes the same androecium, differing by simple germen and simple style.

<sup>7</sup> Spec. 1, *S. indica* WIGHT et ARN. *loc. cit.*

16 ? **Tapirira** AUBL.<sup>1</sup>—Flowers polygamous, 4–5-merous, nearly of *Sorindeia* and *Nothoprotium*; sepals and petals imbricated. Stamens twice as numerous as petals inserted below cupular disk. Germen in male flower 4–5-merous, more or less immersed in disk and free from the style except at base; in female flower 1-locular; styles thick, 3–5 truncate or capitellate stigmatiferous at apex; ovule inserted somewhat below apex of cell, descendent; micropyle superior. Drupe compressed; exalbuminous seed and other characters of *Sorindeia*.—Erect or scandent trees or shrubs; leaves alternate, imparipinnate; folioles often opposite; inflorescence of *Sorindeia* or *Spondias*. (*Tropical Asia, Africa, and America*.<sup>2</sup>)

17 ? **Hæmatostaphis** HOOK. F.<sup>3</sup>—Flowers diœcious 3-merous, subregular or slightly irregular; male calyx small, 3-fid, imbricated, afterwards subvalvate. Petals 3, longer, often unequal, imbricated. Stamens 6, 2-seriate; filaments slender, inserted outside between 2-fid, 3 lobes of interior disk; 3, alternipetalous, much longer; anthers small, introrse, 2-rimose. Female flower? Fruit drupaceous oblong; <sup>4</sup> putamen bony; cell inwardly subcarinate; seed descendent; embryo?—A small glabrous tree; leaves alternate imparipinnate, collected at summit of twigs deciduous; folioles alternate petiolulate oblong; flowers <sup>5</sup> in elongated axillary racemes much ramified “paniculate;” pedicels bracteate at base. (*Tropical West Africa*.<sup>6</sup>)

18. **Gluta** L.<sup>7</sup>—Flowers hermaphrodite, 4–6-or oftener 5-merous; calyx subspathaceous valvate, unequally-broken, caducous. Petals usu-

<sup>1</sup> Guén. i. (1775), 470, t. 188.—*Juncquetia* SCHREB. *Gen.* (1789), 398.—*Tapiria* J. *Gen.* (1789), 372.—POIR. in *Lamk. Diet.* vii. 583.—LAMK. *Ill.* t. 283.—DC. *Prodr.* ii. 90.—ENDL. *Gen.* n. 5943.—B. H. *Gen.* 423, n. 20.—MARCH. *Anacard.* 34, 163.—*Salaberria* NECK. *Elem.* n. 985.—*Pegia* COLEBR. in *Trans. Linn. Soc.* xv. 564.—*Cyrtocarpa* H. B. K. *Nov. Gen. et Spec.* vii. 20, t. 609.—*Odina* ROXB. *Fl. Ind.* ii. 293.—ENDL. *Gen.* n. 5898.—MARCH. *loc. cit.* 38.—B. H. *Gen.* 423, 1001, n. 22.—*Phlebochiton* WALL. in *Trans. Med. et Phil. Soc. Cal.* vii. 230.—ENDL. *Gen. Suppl.* iii. 100.—*Lamnea* GUILL. et PERR. *Fl. Sen. Tent.* i. 153, t. 42.—*Harpephyllum* BERNH. ex KRAUSS, in *Flora* (1844), 349.—*Wirtgenia* (part.) JUNGH. in *Flora* (1844), 624 (ex HASSK. *Cat. Hort. Bog.* 247).

<sup>3</sup> Spec. about 25. HARV. et SOND. *Fl. Cap.* i. 503 (*Odina*), 524 (*Harpephyllum*).—PL. et TR.

in *Ann. Sc. Nat.* sér. 5, xiv. 293.—NETTO, in *Ann. Sc. Nat.* sér. 5, v. 85, t. 9 (*Odina*).—OLIV. *Fl. trop. Afr.* i. 445 (*Odina*).—MIQ. *Fl. Ind.-Bat.* i. p. ii. 622 (*Odina*).—WALP. *Rep.* i. 550, v. 412 (*Odina*), 416; *Ann.* ii. 280; iii. 843 (*Odina*); vii. 646 (*Odina*).

<sup>3</sup> In *Trans. Linn. Soc.* xxiii. 169, t. 25.—B. H. *Gen.* 422, n. 18.—MARCH. *Anacard.* 29, 160.

<sup>4</sup> “Uvæ sanguineæ subsimilis, edulis.”

<sup>5</sup> Small, white.

<sup>6</sup> Spec. 1. *H. Barteri* Hook. F. *loc. cit.*—OLIV. *Fl. trop. Afr.* i. 443.—WALP. *Ann.* vii. 646.

<sup>7</sup> *Mantis.* 293.—J. *Gen.* 427.—DC. *Prodr.* i. 501.—ENDL. *Gen.* n. 5911.—B. H. *Gen.* 421, n. 10.—MARCH. *Anacard.* 112, 189.—*Syndesmis* WALL. in *Roxb. Fl. Ind.* ii. 314.—*Stagmaria* JACK. *Mal. Misc.* ex Hook. *Comp. to Bot. Mag.* i. 267.



ally 5, the margins inserted vertically on elongate 5-agonal receptacle ; but the middle internal face of the stalk free ;<sup>1</sup> limb contorted or more rarely imbricated, finally patent. Stamens equal in number to petals alternating with them ; filaments superposed to spurs of receptacle, inserted higher, otherwise free ; anthers introrse, 2-rimose. Germen stipitate oblique subglobose slightly gibbous ; style eccentric erect, simple, stigmatiferous at apex ; ovule in cell 1-basilar descendent from summit of funicle. Fruit subbaccate, corticate deformed, hence sulcate ; seed conformed to cell with accrescent testa ;<sup>2</sup> cotyledons of exalbuminous embryo connate ; radicle short obtuse incurved.—Trees ; leaves alternate petiolate simple oblong coriaceous ; flowers<sup>3</sup> in much ramified-compound axillary and terminal racemes. (*Ind. Arch. Malacassia*.<sup>4</sup>)

19. **Swintonia** GRIFF.<sup>5</sup>—Flowers hermaphrodite ; lobes of small calyx, round imbricated. Petals 5, longer, adnate to base of cylindrical receptacle elongated between them and insertion of stamens and calyx, imbricated, much accrescent. Stamens 5, alternipetalous hypogynous free ; anthers introrse, 2-rimose. Germen sessile on summit of ovoid receptacle, 1-locular ; style straight, disciform stigmatiferous at apex ; ovule basilar suspended from summit of funicle. Fruit drupaceous subdry (?) ; petals accrescent foliaceous stipate ; seed ?—A large glabrous tree ; leaves alternate simple oblong-lanceolate entire pellucid-punctuate ; flowers in large terminal much racemose-compound clusters. (*Malaisia, Sumatra*.<sup>6</sup>)

20. **Melanorrhœa** WALL.<sup>7</sup>—Flowers hermaphrodite (nearly of *Swintonia*) ; sepals 5, valvate, unequally-cut in calyx or calyptrate deciduous coherent. Petals elongate, contorted or imbricated, accrescent after anthesis ; stamens  $\infty$  sometimes very numerous, inserted on receptacle, dilated at base into a thick disk ; filaments slender erect ; anthers introrse. Germen stipitate oblique, 1-locular ; style simple, stigmatiferous not dilated at apex ; ovule basilar

<sup>1</sup> Receptacle laterally clothed with the same number.

<sup>2</sup> "Succo balsameo atro farcta."

<sup>3</sup> Flavid or ochraceus."

<sup>4</sup> Spec. 6, 7. BL. in *Flora* (1825) ; *Bijdr.* 1159 ; *Mus. Lugd.-Bat.* 182, t. 39.—MIQ. *Fl. Ind.-Bat.* i. p. ii. 622.—WALP. *Rep.* i. 555 ; v. 415 ; *Ann.* ii. 283.

<sup>5</sup> "In *Duchtre Rev. Bot.* ii. 330."—B. H.

*Gen.* 421, 1001, n. 14.—MARCH. *Anacard.* 111, 188.—*Astropetalum* GRIFF. *Notul.* iv. 411.—*Anauxopetalum* TEYSM. et BINN. in *Journ. Bot. Neerl.* i. 368.

<sup>6</sup> Spec. 1. *S. florida* GRIFF. *loc. cit.*

<sup>7</sup> *Pl. As. Rar.* i. 9, t. 11, 12.—ENDL. *Gen.* n. 5910.—B. H. *Gen.* 421, n. 13.—MARCH. *Anacard.* 114, 187.

suspended from funicle. Fruit long stipitate, enlarged at base by stellate patent foliaceous much accrescent petals, subglobose, reniform or depressed, indehiscent. Cotyledons of thick seed conformed to cell, plano-convex; radicle short accumbent ascendent.—Large trees with varnish like sap; leaves alternate simple entire coriaceous exstipulate; flowers<sup>1</sup> in axillary much compound-ramified racemes. (*Malaisia, Bornea, Birmah.*<sup>2</sup>)

21. **Astronium** JACQ.<sup>3</sup>—Flowers hermaphrodite or polygamous (nearly of *Melanorrhæa*); sepals 5, or orbicular (coloured), imbricated, finally accrescent and scarious, persistent round base of fruit. Petals 5, alternate, sometimes in female flower small squamiform, imbricated. Stamens 5, alternipetalous, inserted below base of annular 5-lobed disk; filaments free short; anthers (effete in female flower), introrse, 2-rimose. Germen sessile, 1-locular; style branches 3, short; inserted at summit of germen, stigmatiferous at apex; ovule descendent from wall of cell near apex; micropyle superior. Fruit drupaceous or coriaceous, oblong or subglobose rostrate, involucrate with foliaceous calyx; testa of oblong seed membranous; radicle of exalbuminous embryo short straight accumbent; cotyledons straight plano-convex.—Large trees; leaves alternate imparipinnate, folioles opposite, entire or crenate; flowers<sup>4</sup> crowded in much ramified-compound axillary and terminal racemes. (*South trop. Cont. America and Antilles.*<sup>5</sup>)

22. **Parishia** HOOK, JUN.<sup>6</sup>—Flowers (nearly of *Astronium*) 4-merous; sepals valvate. Petals oblong, crose, imbricated. Fruit ovoid tomentose, surrounded by 4 large obtuse veined sepals. Other characters of *Astronium*.—A choice tree; leaves alternate imparipinnate; folioles  $\infty$ , alternate petiolate coriaceous; inflorescence large (ferruginous-tomentose) nutant. (*Malaisia.*<sup>7</sup>)

23. **Loxostylis** SPRENG.<sup>8</sup>—Flowers polygamous; sepals 5, lanceo-

<sup>1</sup> Medium.

<sup>2</sup> Spec. 3, 4. WALP. *Rep.* i. 555.

<sup>3</sup> *Stirp. Amer.* 261, t. 181, fig. 96.—K. in *Ann. Sc. Nat.* sér. 1, ii. 341.—DC. *Prodr.* ii. 65.—ENDL. *Gen.* n. 5909.—B. H. *Gen.* 423, 1000, n. 24.—MARCH. *Anac.* 77, 199 (part.).—*Myracrodruon* ALLEM. in *Trab. Comm. Sc. de Expt. Sect. Bot.* 3, t. 1, 2.

<sup>4</sup> Small, bracteate.

<sup>5</sup> Spec. 8, 9. GRISEB. *Fl. Brit. W.-Ind.* 176.—TR. et PL. in *Ann. Sc. Nat.* sér. 5, xiv. 288.

—MARCH. in *Afr. Vidd. Medd. Kjob.* (1873), 413.—WALP. *Ann.* vii. 646.

<sup>6</sup> In *Trans. Linn. Soc.* xxiii. 169, t. 26.—B. H. *Gen.* 424, n. 24.

<sup>7</sup> Spec. 1. *P. insignis* HOOK. *r. loc. cit.*—*Astronium insigne* MARCH. *Anacard.* 79, 179.

<sup>8</sup> EX REICHB. *lc. Exot.* t. 205.—ECKL. et ZEYH. *Enum. Pl. Cap.* 162.—ENDL. *Gen.* n. 5908.—B. H. *Gen.* 421, n. 12.—MARCH. *Anacard.* 80, 180.—*Anasyllis* E. MEY. in *exs. Dræg.* (ex. ENDL.).

late membranous, imbricated, in the female flower finally accrescent. Petals 5, longer, slightly unequal, imbricated. Stamens 5, alternipetalous; filaments alternating with the same number of 2-fid glands, inserted round shortly cupular receptacle, very unequal; anthers introrse, 2-rimose. Germen (in male flower 0) oblique compressed, 1-locular; branches of lateral style 3, unequally long, capitate, stigmatiferous at apex; ovule inserted at summit of short ascendent funicle; micropyle superior. Drupe suborbicular oblique compressed, much surpassed in length by foliaceous accrescent calyx; epicarp subcrustaceous; mesocarp densely fleshy (black); putamen reniform corneous; seed ascendent; cotyledons of exalbuminous embryo rather flat; radicle accumbent rather longer. A small glabrous tree; leaves alternate imparipinnate; folioles opposite entire coriaceous; rachis winged; flowers in terminal much ramified-compound racemes. (*South Africa*.<sup>1</sup>)

24. **Loxopterygium** Hook. JUN.<sup>2</sup>—Flowers polygamous (nearly of *Astronium*); calyx 5-lobed, imbricated. Petals same in number, small, imbricated. Stamens equal in number to petals, alternate, inserted below thick annular and obtusely lobed disk; filaments subulate; anthers small, introrsely rimose. Germen 1-locular compressed-winged produced, and 3-capitellate-stigmatiferous; ovule basilar-erect inserted at summit of funicle; micropyle inferior. Fruit dry, produced at apex in suberect or falcate wing-shaped veined samara; testa of inverse seeds membranous; cotyledons of fleshy embryo superior plano-convex.—Large trees; leaves alternate imparipinnate; folioles opposite petiolulate or sessile, entire or crenate-dentate; flowers in much ramified axillary racemes “paniculate.” (*Trop. America*.<sup>2</sup>)

25. **Botryceras** W.<sup>4</sup>—Flowers diœcious or polygamous, 4-5-merous; sepals oblong, imbricated, persistent. Petals same in number alternate reflexed-patent, imbricated. Stamens equal in number, inserted below a rather wide fleshy disk; filaments free; anthers introrse, gibbous, 2-rimose. Germen compressed-ovate;

<sup>1</sup> Spec. 1. *L. alata* SPRENG.—ECKL. et ZEYH. Enum. 152.—HARV. et SOND. Fl. Cap. i. 524.  
—*L. latifolia* PRESL.—*Anasyllis angustifolia* E. MEY.—*A. latifolia* E. MEY.

<sup>2</sup> Gen. 419, n. 6.—MARCH. Anacard. 180.

<sup>3</sup> Spec. 2, 3.

<sup>4</sup> In Berl. Mag. v. 396.—ENDL. Gen. n. 5907.—B. H. Gen. 426, n. 33.—MARCH. Anacard. 75, 177.—*Lawophyllus* THUNB. Prodr. 31; Fl. Cap. 153.—BERNH. in Linnæa, xii. 129-136.—*Daphnitis* SPRENG. Syst. i. 370.

style short lateral oblique, 3-4-lobed stigmatiferous at apex; ovule not far from apex of cell descendent; micropyle superior. Drupe compressed sub-ovate scantily fleshy, persistently accrescent with lateral style; exocarp narrow winged, thinly veined; putamen hard pale; embryo of descendent seed exalbuminous; cotyledons plano-convex rather fleshy; radicle short superior.—A glabrous shrub; leaves alternate petiolate simple serrate coriaceous; flowers<sup>1</sup> in very ramified compound terminal racemes; branches of female inflorescence finally compressed accrescent-dilated thick pectinate incurved and hard;<sup>2</sup> bracts persistent. (*South Africa*.<sup>3</sup>)

26. **Smodingium** E. MEY.<sup>4</sup>—Flowers polygamous; calyx small, 5-dentate persistent. Petals 5, oblong patent, imbricate, deciduous. Stamens 5, alternipetalous, inserted below annular disk. Germen sessile, 1-locular; styles 3, capitellate stigmatiferous at apex; “ovule descendent from summit of cell.” Fruit compressed samaroid oblong, unequally winged at margin, vittate on both sides;<sup>5</sup> putamen coriaceous; embryo of compressed subreniform seeds rather fleshy, exalbuminous; cotyledons thin unequally-oblong; radicle superior conical uncinate accumbent.—A glabrous shrub; leaves alternate petiolate, 3-foliolate; folioles serrate; flowers<sup>6</sup> in compound “paniculate” terminal racemes. (*South Africa, Mexico*.<sup>7</sup>)

27 ? **Faguetia** MARCH.<sup>8</sup>—Flowers dioecious regular, usually 4-merous; lobes of gamophyllous calyx imbricated. Petals imbricated. Stamens equal in number to petals, shorter alternate; filaments free subulate inserted below slightly perigynous crenulate disk incurved at apex; anthers introrse, 2-rimose. Germen rudimentary in male flower, free, strictly surrounded by base of disk, 1-locular; style very short, 2-3-stigmatiferous, lobed at apex. Ovule 1, laterally ascendent, suspended from summit of funicle; micropyle introrse superior obturated. Fruit long samaroid<sup>9</sup> lanceolate sub-falcate, compressed, acute at apex, at base attenuate in long wing; cell sub-apiculate, 1-spermous; testa of descendent (immature) seed membranous; cotyledons of exalbuminous embryo.

<sup>1</sup> Small.

<sup>2</sup> Representing a subfasciate monstrous horn.

<sup>3</sup> Spec. 1. *B. laurinum* W. loc. cit.—HARV. et SOND. *Fl. Cap.* i, 524.—*Laurophyllus capensis* THUNB.—*Daphnitis capensis* SPRENG. loc. cit.

<sup>4</sup> In *exs. Dræg.* (ex HARV. et SOND. *Fl. Cap.* i, 523).—B. H. *Gen.* 423, n. 17.—MARCH.

*Anacard.* 83, 178.

<sup>5</sup> Stripes resinous longitudinal black.

<sup>6</sup> Small, crowded.

<sup>7</sup> Spec. 3. H. BN. in *Adansonia*, xi, 182.—WALP. *Ann.* vii, 646.

<sup>8</sup> *Anacard.* 84, 176, t. 2.

<sup>9</sup> Recalls Samara of the *Fraxinea*.

linear-elongate flat; radicle short superior."—A glabrous tree; leaves alternate, collected at summit of twigs imparipinnate; folioles opposite; flowers<sup>1</sup> in axillary ramified-cymiferous racemes. (*Madagascar*.<sup>2</sup>)

28. **Juliana** SCHLCHTL.<sup>3</sup>—Flowers diœcious apetalous; "male calyx 4-5-phyllous; folioles unequal, imbricated. Stamens same in number; filaments filiform; anthers large. Perianth (?)<sup>4</sup> adnate to base of germen 5-lobed(?), produced at base in 2, coriaceous pedicellate long decurrent-adnate wings (?). Germen 1-locular; cell laterally 1-ovulate;<sup>5</sup> styles 3-spathulate." Fruit coriaceous, 1-locular, 1-spermous, produced at base in long compressed samara (pedicellate dilated ?)—Trees; leaves collected at summit of twigs, alternate imparipinnate, 3-∞ foliolate; folioles opposite serrate; flowers in compound ramified racemes.<sup>6</sup> (*Mexico, Peru*.<sup>7</sup>)

29. **Rhus** L.<sup>8</sup>—Flowers polygamous; receptacle depressed, clothed inwardly with annular disk often thick; sepals 4-6, equal, imbricated, usually persistent.<sup>9</sup> Petals same in number, longer, imbricated, very patent. Stamens 4-10, 1-2-seriate, inserted with perianth below disk; filaments free, subulate, often short; anthers (in female flower effete) introrse 2-rimose. Germen rudimentary (effete in male flower) sessile, subglobose or ovoid, 1-locular; branches of apical style 3, varied in form, more or less elongate, obtuse or capitate stigmatiferous at apex. Ovule suspended from summit of subbasilar funicle; micropyle superior. Fruit drupaceous compressed, sometimes reniform; putamen osseous, ligenous, crustaceous or coriaceous; testa of inverse seed membranous; cotyledons of exalbuminous embryo rather flat; radicle short uncinate.—Trees or shrubs; juice resinous verrucose or caustic; leaves alternate, simple (*Heeria*<sup>10</sup>), 1-3-foliate or imparipinnate; folioles entire serrate or dentate; flowers

<sup>1</sup> Small, crowded.

<sup>2</sup> Spec. 1. *F. falcata*, MARCH. *loc. cit.*

<sup>3</sup> In *Linnaea*, xvii. 746.—B. H. *Gen.* 428, n. 46 (*Anacard.*).—*Hypopterygium* SCHLCHTL. in *Linnaea*, xvii. 635.

<sup>4</sup> "Involucrum?" (B. H.).

<sup>5</sup> Cells 1, 2 effete (?) lateral.

<sup>6</sup> A genus imperfectly known, apparently allied to the preceding, known to us by a fructiferous specimen from Mexico (monstrous ?)

<sup>7</sup> Spec. 2. A. GRAY, in *Amer. Expl. Exp. Bot.* i. 371.—WALP. *Rep.* v. 420.

<sup>8</sup> *Gen.* n. 369.—ADANS, *Fam. des. Pl.* ii.

342.—J. *Gen.* 369.—LAMK. *Ill.* t. 207.—POIR. *Diet.* vii. 501; Suppl. v. 263.—GERTN. *Fruct.* i. 205, t. 44.—K. in *Ann. Sc. Nat.* sér. 1, ii. 337.—DC. *Prodr.* ii. 66.—SPACH. *Suit. à Buffon*, ii. 209.—ENDL. *Gen.* n. 5905.—PAYER, *Organog.* 90, t. 19.—B. H. *Gen.* 419, n. 1 (part.).—MARCH. *Anac.* 86, 181 (incl.: *Anaphrenum* E. MEY. *Cotinus* T. *Heeria* MEISSN. *Lobadium* RAFIN. *Malosma* NUTT. *Metopium* P. BR. *Ozoroa* DEL. *Rœmeria* THUNB. *Styphonia* NUTT. *Toxicodendron* T. *Turpinia* RAFIN. *Schmalzia* DESVX).

<sup>9</sup> Greenish or petaloid.

<sup>10</sup> MEISSN. *Gen. Comm.* 55.—*Rœmeria* THUNB.

in axillary and terminal more or less ramified compound racemes; pedicels 2-4-bracteate (*Styphonia*<sup>1</sup>), or sometimes (*Cotinus*<sup>2</sup>), partly abortive plumose-hirsute. (*All warm and temperate regions*.<sup>3</sup>)

30? **Comocladia** P. BR.<sup>4</sup>—Flowers (nearly of *Rhus*) hermaphrodite or polygamous, 3 or more rarely 4-merous; sepals<sup>5</sup> and petals alternate, imbricate. Stamens equal in number to petals and alternate, inserted below intervals of central disk lobes; anthers introrse. Germen sessile; styles 3, very short, dilated, stigmatiferous at apex; ovule suspended from basilar funicle. Fruit drupaceous oliviform; testa of oblong seed thin; cotyledons of exalbuminous embryo fleshy, plano-convex; radicle superior accumbent.—Trees with abundant juice;<sup>6</sup> leaves alternate, imparipinnate; folioles opposite often coriaceous or spinose dentate; flower<sup>7</sup> in axillary compound racemes, sometimes subsimple. (*Tropical America*.<sup>8</sup>)

31. **Pistacia** L.<sup>9</sup>—Flowers diœcious apetalous, male calyx small, imbricated, 5-partite or 5-fid; leaves bractiform. Stamens usually 5, inserted round small annular disk; filaments free short; anthers 2-rimose.<sup>10</sup> Germen rudimentary minute or 0. Female calyx 3-5-fid or partite, imbricated. Germen 1-locular;<sup>11</sup> style erect, afterwards divided in 3 unequal or equal branches recurved or revolute, stigmatiferous within; ovule ascendent, suspended from subbasilar funicle; micropyle introrse superior, obturated with more or less dilated

*Fl. Cap.* 194 (not MED. nor RADD. nor ZEA, nor TRATT.).—*Ocotea* DEL. in *Ann. Sc. Nat. sér. 2*, xx. 91, t. 1.—*Anaphrenium* E. MEY. in *Exs. Drèg.*—WALP. *Rep.* v. 414; *Ann.* ii. 283.

<sup>1</sup> NUTT. in *Torr. et Gr. Fl. N.-Amer.* i. 220—WALP. i. 555.

<sup>2</sup> T. *Inst.* 610, t. 380.

<sup>3</sup> Spec. about 110. H. B. K. *Nov. Gen. et Spec.* t. 603, 604.—WIGHT et ARN. *Prodr.* i. 172.—A. GRAY, *Gen. Ill.* t. 159, 160.—HARV. et SOND. *Fl. Cap.* i. 504.—BENTH. *Fl. Hongk.* 69; *Fl. Austral.* i. 488.—GRISEB. *Fl. Brit. W.-Ind.* 175.—TR. et PL. in *Ann. Sc. Nat. sér. 5*, xiv. 288.—OLIV. *Fl. Trop. Afr.* i. 436.—SCHWEINF. *Beitr. Fl. Æthiop.* 32 (*Anaphrenium*), 33.—TORR. in *Emor. Rep. Bot.* t. 7.—GREN. et GODR. *Fl. de Fr.* i. 340.—WALP. *Rep.* i. 551; ii. 829; v. 414; *Ann.* i. 199, 967; ii. 282; iv. 447; vii. 641.

<sup>4</sup> *Jam.* 124.—J. *Gen.* 370.—LAMC. *Dict.* ii. 69; *Suppl.* ii. 325; *Ill.* t. 17.—K. in *Ann. Sc. Nat. sér. 1*, ii. 341.—DC. *Prodr.* ii. 65.—ENDL.

*Gen.* n. 5896.—B. H. *Gen.* 419, n. 2.—MARCH. *Anacard.* 90, 183.—*Dodonæa* PLUM. *Amer.* (ed. BURM.), 18 (nec L.).

<sup>5</sup> Often subpetaloid.

<sup>6</sup> Glutinous, nigrescent, sometimes very pungent.

<sup>7</sup> Small greenish or purplish.

<sup>8</sup> Spec. about 4. JACQ. *Amer.* 12, t. 173, fig. 4.—H. B. K. *Nov. Gen. et Spec.* vii. 15, t. 607.—GRISEB. *Fl. Brit. W.-Ind.* 175.

<sup>9</sup> *Gen.* n. 1108.—ADANS. *Fam. des Pl.* ii. 342.—K. in *Ann. Sc. Nat. sér. 1*, ii. 329.—DC. *Prodr.* ii. 64.—SPACH, *Suit à Buffon*, ii. 195.—ENDL. *Gen.* n. 5893.—B. H. *Gen.* 419, n. 3.—MARCH. *Anacard.* 98, 132, 186, t. 1, 3.—*Terebinthus* T. *Inst.* 579, t. 345.—J. *Gen.* 371.—*Lentiscus* T. *op. cit.* 580.

<sup>10</sup> Pollen spherical. "Sur l'équateur, quatre papilles entourées d'un halo (*P. Terebinthus*); huit à douze pores irrégul. épars (*P. Lentiscus*)."  
(H. MOHL, in *Ann. Sc. Nat. sér. 2*, iii. 340.)

<sup>11</sup> Cells sometimes 1, 2, effete.

funicle.<sup>1</sup> Fruit drupaceous; mesocarp thin, finally subdry; putamen osseous or chartaceous; testa of compressed seeds suspended from much compressed funicle, thin; cotyledons of exalbuminous sometimes unequally gibbous embryo<sup>2</sup> thick, plano-convex; radicle superior accumbent.—Trees or small trees; odour terebinthaceous; leaves alternate impari- or paripinnate, sometimes 3-foliate, exstipulate, deciduous or perennial; flowers in subsimple or more or less compound cymiferous axillary racemes bracteate. (*Medit. Reg, Temp. Ins. Asia, East. Africa, Cent. America.*<sup>3</sup>)

32. **Mangifera** L.<sup>4</sup>—Flowers polygamous-dioecious; sepals 4, 5, imbricated deciduous. Petals 4, 5, alternate, at the middle incrassate within, below imbricated. Stamens 4, 5, alternipetalous, inserted below thickly pulviniform or stipitiform disk; filaments (of which 1, 2 or often longer than the others) free or united at base, and sometimes connate with disk; anthers (effete in female flower) introrse, 2-rimose. Germen free sessile, 1 locular;<sup>5</sup> style lateral simple, not dilated stigmatiferous at apex. Ovule suspended from summit of short subbasilar funicle more or less high adnate to wall; micropyle introrse superior. Drupe<sup>6</sup> ovoid or subreniform; mesocarp sometimes very fleshy; putamen thick, outwardly fibrous or sublanate, 2-valved or evalvate; testa of compressed seeds chartaceous or pergamentaceous; cotyledons of thick exalbuminous embryo<sup>7</sup> large fleshy plano-convex, sometimes lobed; radicle inferior ascendent<sup>8</sup>.—Trees; leaves alternate petiolate simple entire coriaceous; flowers<sup>9</sup> in terminal much ramified compound-cymiferous racemes; pedicels articulate. (*Tropical Asia.*<sup>10</sup>)

<sup>1</sup> MARCH. *Anacard.* t. 1, fig. 18–27.

<sup>2</sup> Often green.

<sup>3</sup> Spec. 6, 7. H. B. K. *Nov. Gen. et Spec.* vii t. 608.—WEBB. *Phyt. canar.* t. 66.—GREN. et GODR. *Fl. de Fr.* i. 339.—H. BN. in *Adansonia*, xi. 181.—WALP. *Rep.* i. 549; *Ann.* ii. 280; iii. 843; iv. 146; vii. 643.

<sup>4</sup> *Gen.* n. 278.—J. *Gen.* 369.—GÆRTN. *Fruct.* ii. 96, t. 100.—LAMK. *Ill.* t. 138.—DESROUSS. *Dict.* iii. 696; Suppl. iii. 583.—K. in *Ann. Sc. Nat.* sér. 1, ii. 335.—DC. *Prodr.* ii. 63.—SPACH. *Suit à Buffon*, ii. 192.—ENDL. *Gen.* n. 5915.—PAYER *Organog.* 91, t. 20.—B. H. *Gen.* 420, n. J.—MARCH. *Anacard.* 104, 190.

<sup>5</sup> Carpels sometimes (in cultivated spec.) 3–5, free, of which 3, 4, are sterile and smaller.

<sup>6</sup> Usually large, yellowish, greenish, purplish or violet.

<sup>7</sup> Seeds sometimes polembyronic (REINW. in *Nor. Act. Nat. Cur.* xii. 341. t. 36).

<sup>8</sup> Plumule sometimes more or less plainly ramified in germination.

<sup>9</sup> Often pale yellowish, 1 *M. indica*, purple-striped.

<sup>10</sup> Spec. about 12, of which 1 is cultivated between the tropics. RHEED. *Hort. Malab.* iv. t. 1, 2 (*Man*).—JACQ.  *Ic. Rar.* t. 337.—TUSS. *Fl. A. t.* ii. t. 15.—TURP. in *Diet. Sc. Nat. Atl.* t. 262.—RUMPH. *Herb. Amboin.* i. 93, 25.—WIGHT et ARN. *Prodr.* i. 169.—HOOK. f. in *Trans. Linn. Soc.* xxiii. t. 23.—MIQ. *Fl.-Ind. Bat.* i. p. ii. 627; Suppl. i. 521.—KL. in *Pet. Moss. Bot.* 90.—BENTH. *Fl. Hongk.* 69.—GRISEB. *Fl. Brit. W.-Ind.* 176.—TR. et PL. in *Ann. Sc. Nat.* sér. 5, xiv. 287.—OLIV. *Fl. Trop. Afr.* i. 442.—KURZ, in *Flora* (1870), 345.—MARCH. in *Vid.*

33. **Anacardium** ROTTB.<sup>1</sup>—Flowers polygamous, 5-merous; sepals erect, imbricate, deciduous. Petals longer, imbricated, acute recurved. Stamens 8-10, 2-seriate verticillate; filaments unequal connate at base in glandular ring, otherwise free; anthers introrse, longitudinally 2-rimose, or in 1 (or more rarely 2 and 3), stamens polleniferous; in others sterile small. Germen free, 1-locular; unequally compresso-ovate or obovate, hence gibbous; style excentric simple, obtuse or scarcely incrassate stigmatiferous at apex; ovule solitary long conical inserted at summit of suberect funicle, transverse or ascendent; chalaza superior; micropyle introrse inferior near funicle. Fruit dry nucamentaceous reniform, marked in lateral sinus with umbilicus and cicatrice of style; mesocarp lacunose oleose-resinous; peduncle below fruit much incrassate large piriform fleshy.<sup>2</sup> Seed ascendent conformed to pericarp; funicle near base, lateral; testa membranous; cotyledons of exalbuminous embryo thick plano-convex semilunar; radicle short inferior incurved.—Trees or shrubs; leaves alternate simple petiolate entire; flowers in ramified terminal racemes, bracteate. (*Tropical America*.<sup>3</sup>)

34. **Semecarpus** L. JUNR.<sup>4</sup>—Flowers polygamous (nearly of *Rhus*) usually 5-merous; calyx 5-fid, imbricated, deciduous. Petals imbricated. Stamens 5, alternate, inserted below disk. Germen sessile, 1-locular; styles 3, divergent; incrassate stigmatiferous at apex, subclavate or shortly 2-lobed; ovule inserted at apex of cell descendent. Fruit nucamentaceous, or more or less drupaceous, unequally compressed or reni-

*Medd, Kjob.* (1873) 416.—*Bot. Mag.* t. 4510.—*WALP. Rep.* i. 555; *Ann.* i. 200; ii. 283; vii. 644.

<sup>1</sup> In *Act. hafn.* ii. 252 (not LAMK.).—in *Ann. Sc. Nat.* sér. 1, ii. 334.—DC. *Prodr.* ii. 62.—A. S. H. in *Guillemin. Arch. Bot.* i. 269.—SPACH, *Suit. à Buffon*, ii. 187.—ENDL. *Gen.* n. 5916.—B. H. *Gen.* 420, n. 8.—MARCH. *Anacard.* 107, 191.—H. BN. in *Adansonia*, xi. 158.—*Cassurium* RUMPH. *Herb. Amboin.* i. 177, t. 69.—LAMK. *Dict.* i. 22; *Suppl.* i. 331; *Ill.* t. 322.—J. *Gen.* 368.—*Acajou* T. *Int.* 658, t. 435.—*Acajuba* GÆRTN. *Fruet.* i. 192, t. 40.—*Rhinocarpus* BERT. MSS. (ex K. loc. cit. 335).—*Monodynamis* POHL, *Pl. Bras.* ii. 67, t. 144.

<sup>2</sup> For evolutions of which see *Adansonia*, xi. 162.

<sup>3</sup> Species about 6, of which 1 is cultivated between the tropics with very divers forms, JACQ. *Amer.* i. 124, t. 181, fig. 35.—TURP. in *Dict. Sc. Nat. Atl.* t. 261 (*Cassurium*).—GRISEB. *Fl. Brit. W.-Ind.* 176.—TR. et PL. in *Ann. Sc. Nat.* sér. 5, xiv. 287.—MARCH. in *Vid. Medd. Kjob.* (1873), 416.—WIGHT et ARN. *Prodr.* ii. 62.—KL. in *Pet. Mossamb. Bot.* 91.—OLIV. *Fl. trop. Afr.* i. 443.—WALP. *Rep.* i. 555; *Ann.* i. 200.

<sup>4</sup> *Suppl.* 285.—K. in *Ann. Sc. Nat.* sér. 1, ii. 337.—DC. *Prodr.* ii. 62.—SPACH, *Suit à Buffon*, ii. 189. ENDL. *Gen.* n. 5917.—B. H. *Gen.* 424, n. 25.—MARCH. *Anac.* 62, 170.—*Anacardium* LAMK. *Dict.* i. 139; *Ill.* t. 208 (nec L.).—GÆRTN. *Fruet.* i. 192, t. 40.—*Oncocarpus* A. GRAY, in *Amer. Ezpl. Exp. Bot.* i. 364, t. 43.—B. H. *Gen.* 424, n. 26.



form, seated at summit of or more or less immersed in accrescent cupuliform or turbinate, sometimes fleshy, peduncle; testa of descending seed coriaceous; endopleura membranous or rather fleshy; cotyledons of thick exalbuminous embryo plano-convex, entire or lobed (*Oncocarpus*); radicle short superior or lateral.—Trees; leaves alternate simple petiolate coriaceous; flowers in lateral or terminal ramified compound racemes. (*Trop. Asia and Oceania*.<sup>1</sup>)

**35. Nothopegia** BL.<sup>2</sup>—Flowers polygamous (nearly of *Semecarpus*), 4-merous; corolla imbricated. Stamens 4, inserted between lobes of interior disk. Germen sessile; ovule descendent inserted slightly below apex of cell; other characters as in *Semecarpus*.—A glabrous tree; leaves alternate petiolate entire; inflorescence axillary subsimple.<sup>3</sup> (*Eastern India*.<sup>4</sup>)

**36. Campnosperma** THW.<sup>5</sup>—Flowers hermaphrodite, 3-merous or more rarely 4-5-merous (*Drepanospermum*); calyx and corolla imbricated. Stamens twice as numerous as petals inserted below disk. Gynæceum and other characters of *Semecarpus*; style short, wide discord stigmatiferous at apex; ovule inserted below apex of cell, descendent. Drupe fleshy; putamen dependent from processus more or less completely 2-locellate; 1-cell vacant; seed exalbuminous arcuate or hippocrepiform above processus; embryo more or less arched.—A tree; leaves alternate entire; inflorescence axillary or terminal; axis simple or more or less ramified. (*East. Ind., Seychelles Is., Trop. Amer.*<sup>6</sup>)

**37. Holigarna** HAM.<sup>7</sup>—Flowers polygamous, 5-merous; receptacle concave sacciform. Calyx superior, 5-dentate, imbricate. Petals 5, inserted with calyx at mouth of receptacle, valvate,

<sup>1</sup> Spec. about 20. RUMPH. *Herb. Amboin.* i. t. 70 (*Cassurium*).—FORST. *Prodr.* 142 (*Rhus*).—ROXB. *Pl. Coromand.* t. 12.—WIGHT et ARN. *Prodr.* i. 168.—WIGHT, *Icon.* t. 235, 558, 559.—THW. *Enum. Pl. Zeyl.* 75.—BENTH. *Fl. Austral.* i. 491.—WALP. *Rep.* v. 416; *Ann.* ii. 285; iv. 445 (*Oncocarpus*); vii. 647.

<sup>2</sup> *Mus. Lugd.-Bat.* i. 203.—B. H. *Gen.* 425, n. 29.—MARCH. *Anacard.* 67, 172.—*Glycicarpus* DALZ. in *Hook. Journ.* ii. 38.

<sup>3</sup> A genus closely allied to *Semecarpus* (of which a sect. ?)

<sup>4</sup> Spec. 1. *N. racemosa* BL. *loc. cit.*—*Glycicarpus racemosa* DALZ. *loc. cit.*—WALP. *Ann.* iv. 445.

<sup>5</sup> In *Hook. Kew. Journ.* vi. 65, t. 1; *Enum. Pl. Zeyl.* 78.—B. H. *Gen.* 425, n. 3.—MARCH. *Anac.* 73, 174.—BAKER, *Fl. Mauric.* 61.—*Cyrtospermum* BENTH. in *Hook. Kew. Journ.* iv. 13 (nec GRIFF.).—*Drepanospermum* BENTH. *Gen.* 425, n. 31.—*Micrantheia* DUP.-TH. *Herb.* (ex MARCH.).

<sup>6</sup> Spec. about 4. WALP. *Ann.* iv. 444, 445 (*Cyrtospermum*).

<sup>7</sup> Ex ROXB. *Pl. Coromand.* iii. 79, t. 282; *Fl. Ind.* ii. 80.—DC. *Prodr.* ii. 62. ENDL. *Gen.* n. 5914.—B. H. *Gen.* 425, n. 28.—MARCH. *Anac.* 69, 172.—*Hadestaphyllum* DENNST. *Hort. Malab.* iv. 9 (ex ENDL.).

finally patent. Stamens 5, alternipetalous, exterior to annular disk; anthers introrse, 2-rimose. Germen (effete in male flower) inferior, adnate to interior of concave receptacle, 1-locular; branches of terminal style 3, capitate stigmatiferous at apex; ovule 1, appendent to wall of cell slightly below apex; micropyle introrse superior. Drupe<sup>1</sup> inferior subcompressed; mesocarp scanty (resinous); putamen coriaceous; testa of descendent seed membranous; cotyledons of exalbuminous embryo thick plano-convex; radicle short superior.—Tall trees; leaves alternate petiolate entire coriaceous; petiole articulate above middle, there furnished with two deciduous hairs or glands; flowers<sup>2</sup> in axillary and terminal more or less compound glomeruliferous racemes. (*East. Ind.*<sup>3</sup>)

38. **Drimycarpus** HOOK. JUN.<sup>4</sup>.—Flowers polygamous (nearly of *Holigarna*); receptacle concave cupuliform. Calyx and 5 petals imbricated, inserted on margin of receptacle. Stamens same in number, perigynous with perianth at base of disk. Germen inferior 1-locular; style simple rather thick capitate subentire or obtusely 3-lobed at apex. Drupe transverse ellipsoid or oval;<sup>5</sup> putamen coriaceous; seed conformed exalbuminous; cotyledons of thick embryo plano-convex.—Trees; leaves alternate entire, inflorescence and other characters of *Holigarna*. (*East. India.*<sup>6</sup>)

39? **Thyrsodium** BENTH.<sup>7</sup>—Flowers polygamous diœcious; receptacle high cupuliform. Sepals 5, valvate, and petals same in number alternate thick slightly imbricated, all perigynously inserted with stamens at margin of receptacle. Stamens 5, alternipetalous; filaments free; anthers introrse 2-rimose. Gynœceum free, inserted in receptacle, in male flower sterile slender; in female 1-locular; apex alternate in erect simple style; summit of style stigmatiferous unequally capitate, shortly 2-3-lobed. Ovule suspended from summit of funicle, usually short, and inserted in wall of cell; micropyle superior obturated with dilated summit of funicle. Drupe 1-locular; testa of pendulous seed membranous; radicle of exalbuminous embryo superior; cotyledons thin.—Trees; leaves alternate imparipinnate; folioles

<sup>1</sup> "Acrida."

<sup>2</sup> Small.

<sup>3</sup> Spec. 2, 3, WIGHT et ARN. *Prodr.* i. 96.—MARCH. *loc. cit.* 173.

<sup>4</sup> *Gen.* 424, n. 27.—MARCH. *Anacard.* 72, 173.

<sup>5</sup> "Acrida."

<sup>6</sup> Spec. 2, 3. ROXB. *Fl. Ind.* i. 82 (*Holigarna*).

<sup>7</sup> In *Hook. Kew. Journ.* iv. 17.—MARCH. in *Adansonia*, vii. 301; *Anacard.* 32, 161.—*Garuga* (part.) B. H. *Gen.* 323.

usually opposite; flowers in compound-cymiferous racemes terminal or in the axils of the upper leaves. (*Trop. South America.*)

40 ? **Pentaspadon** Hook. JUN.<sup>2</sup>—Flowers hermaphrodite (nearly of *Holigarna*); lobes of short calyx slightly imbricated, afterwards not contiguous. Petals imbricated. Stamens 10, inserted round disk, of which 5 alternipetalous are fertile; anthers introrse; others oppositipetalous same in number smaller sterile, glandular-capitate at apex. Germen 1, inserted at summit of rather concave receptacle; style lateral, stigmatiferous at apex; funicle inserted laterally on wall of germen below style, bearing a suspended ovule at apex. Fruit ?—A tall tree; leaves alternate imparipinnate; axillary inflorescence and other characters of *Holigarna*, *Sorindeia* or *Drimycarpus*<sup>3</sup>. (*Borneo and Sumatra.*<sup>4</sup>)

41 ? **Corynocarpus** Forst.<sup>5</sup>—Flowers hermaphrodite; sepals 5, unequal, connate at base, imbricated. Petals 5, alternate longer, imbricated. Stamens 5, fertile opposite petals and adnate to them at base; filaments otherwise free; anthers introrse 2-rimose. Staminodes (?) 5, alternipetalous glanduliform. Germen free, 1-locular; style subapical, capitellate stigmatiferous at apex; ovule 1, descendent, inserted below apex; micropyle superior, ventral below insertion; raphe dorsal. Fruit drupaceous; putamen thin coriaceous fibrous; cell of seed strictly filled; testa membranous, veined; cotyledons of thick embryo plano-convex; radicle short superior.—Glabrous small trees; leaves alternate simple integerrimus penninerved; flowers in terminal ramified cymiferous racemes.<sup>6</sup> (*New Zealand.*<sup>7</sup>)

<sup>1</sup> Spec. about 4. MARCH. *loc. cit.* 162.—WALP. *Ann.* iv. 448.

<sup>2</sup> *Trans. Linn. Soc.* xxiii. 168, t. 24 (1860).—B. H. *Gen.* 419, n. 5.—*Nothoprotium* Miq. *Fl. Ind.-Bat.* Suppl. i. 527 (1861).—B. H. *Gen.* 326, n. 13 (*Burserea*).—MARCH. *Anacard.* 92, 185.

<sup>3</sup> A genus hence allied to the preceding, whence *Tapirira*, from a section of which *Odina* differs only by carpel, hence closely connecting the *Anacardiæ* with *Spondias*.

<sup>4</sup> Spec. 1. *P. Motleyi* Hook. f. *loc. cit.*—*Nothoprotium sumatranum* Miq. *loc. cit.*; *Ann. Mus. Lugd.-Bat.* iii. 90.

<sup>5</sup> *Char. Gen.* 31, t. 16.—L. FIL. *Suppl.* 156.—J. *Gen.* 288.—LAMK. *Dict.* i. 107; *Ill.* t. 143.—A. CUNN. in *Ann. Nat. Hist.* iv. 260.—ENDL. *Gen.* n. 4232 1.—B. H. *Gen.* 425, n. 32.—MARCH. *Anacard.* 59, 167.—H. BN. in *Adansonia*, x. 264; xi. 203.—*Merretia* SOLAND. MSS. (ex ENDL.).

<sup>6</sup> A genus anomalous in order, formerly reckoned among the *Berberidaceæ*, *Ardisiææ*, and *Myrsinææ*.

<sup>7</sup> Spec. perhaps 2, one South Caledonian, the other *C. levigatus* Forst.—Hook. f. *Fl. Nov. Zel.* i. 48; *Handb. N.-Zel. Fl.* 46.—*Bot. Mag.* t. 4379.

## IV. MAPPIÆ.

42. **Mappia** JACQ.—Flowers hermaphrodite or polygamous, 5-merous, calyx small dentate or cut. Petals same in number alternate longer inwardly or on all sides villose or barbate, valvate; apex incurved. Stamens equal in number to petals alternating with them; filaments inserted below hypogynous disk, more or less evolute, filiform at base or dilated and cohering there sometimes with margin of petals; anthers ovate or oblong introrse; cells contiguous or remote longitudinally rimose; connective equal to cells or produced beyond them above. Germen free, 1-locular (very rarely 2-3-locular); style eccentric more or less elongate and before anthesis plicate, inflexed or incurved, capitate stigmatiferous at apex; base sometimes accompanied with two short horns (abortive style branches (?). Ovules in cell 2-nate, collaterally descendent; micropyle introrse superior, sometimes obturated with small dilatation of funicle. Drupe glabrous or villous; flesh often scanty; putamen ligneous or crustaceous, sometimes pergamentaceous; raphe of descendent seed dorsal, sometimes prominent; albumen fleshy; cotyledons of rather large axile embryo, flat or sigmoidal foliaceous thinly membranous; radicle short superior.—Trees or shrubs, sometimes scandent volubile; branches often (from elevate adnate twigs) angulate or costate; leaves alternate, exstipulate, simple, penninerved reticulate-veined; flowers in variously compound ramified terminal lateral or oppositifolious cymes being adnate to branches from the base for a longer or shorter distance. (*Trop. America, South trop. Asia., trop. West Africa*). See p. 277.

43. **Poraqueiba** AUBL.<sup>1</sup>—Flowers (nearly of *Mappia*) hermaphrodite or polygamous; calyx lobes, 4, 5, subimbricate.—Petals furnished inside with prominent plates or ribs?<sup>2</sup> Stamens 5, alternipetalous; filaments dilated; anthers erect introrse. Germen and ovule of *Mappia*; style short, stigmatose subdiscoidal at apex. Fruit nearly that of *Mappia*; cotyledons of incurved or nearly straight shorter by half than the albumen embryo wide slenderly foliaceous; radicle short dilated superior.—Glabrous or silky trees; leaves alternate simple coriaceous; flowers in short contracto-capitate cymuliferous racemes capitules

<sup>1</sup> *Guian.* 123, t. 47.—ENDL. *Gen.* n. 6872.—TUL. in *Ann. Sc. Nat. sér.* 2, xi. 169.—MIERS, in *Ann. Nat. Hist. sér.* 3, iv. 365; *Contrib.* i. 69, 228, t. 10.—B. H. *Gen.* 352, n. 24.—H. BN.

in *Adansonia*, iii. 91. — *Barreria* W. *Spec.* i. 1145.—*Meisteria* Scop. in *Gmel. Syst.* vii. 391.

<sup>2</sup> Villose or pubescent.

otherwise inserted on the branches of the axillary or lateral raceme. *Trop. America*.<sup>1</sup>).

44. **Emmotum** DESVX.<sup>2</sup>—Flowers nearly of *Poraqueiba* (or *Mappia*), usually 5-merous; perianth and stamens of *Poraqueiba*; connective of erect lanceolate anthers rather wide. Germen 3-locular; cells 1-lateral subparallel; ovules descendent (of *Mappia*), 2 in each cell or in the middle cell 2, in the lateral 1; style short or rather long stigmatiferous at apex truncate or dilated. Drupe usually subglobose; putamen osseous, 1-3-locular; seed (in each cell usually 1) albuminous; cotyledons of curved embryo foliaceous rather short; radicle longer.—Glabrous or oftener tomentellose or silky or shining trees; leaves alternate entire coriaceous penninerved elevate-nerved; flowers collected in cymes or densely ramified contracted glomerules axillary or lateral to axils. (*Trop. America*.<sup>3</sup>)

45. **Lasianthera** PAL. BEAUV.<sup>4</sup>—Flowers hermaphrodite or polygamous (nearly of *Mappia*); calyx short cupular; shortly 5-lobed or dentate, imbricated. Petals 5, valvate. Stamens 5, alternipetalous; filaments hypogynous, more or less cohering with petals, attenuate at apex, or oftener the apex introrsely excavate and receiving more or less pendulous anther cells, either glabrous or shortly pilose (*Gomphandra*)<sup>5</sup> or very long penceillate; hairs crowded long and often capitellate, in estivation inflexed above anther (*Eulasianthera*); cells of introrse anthers longitudinally rimose, either nearly quite adnate within to connective or free below. Germen free 1-locular, naked at base or sometimes furnished with a large basilar gland; style apical short, afterwards stigmatiferous dilated sometimes wide discoidal; ovules collateral 2, (of *Mappia*). Drupe oblong or compressed, longitudinally sulcate and nerved, straight or incurved; flesh usually scanty; putamen crustaceous ligneous or fibrous; albumen of descendent seed fleshy, undivided or 2-partite; <sup>6</sup> embryo apical minute.—Trees, often glabrous; leaves alter-

<sup>1</sup> Spec. 2, 3. SPRENG. *Syst.* i. 583 (*Barreria*). WALP. *Ann.* vii. 568.

<sup>2</sup> HAM. *Prodr. Fl. Ind. Occ.* 29.—MIERS *Ann. Nat. Hist. ser.* 3, iv. 366; *Contrib.* i. 106, 229, t. 21, 22.—B. H. *Gen.* 352, n. 25.—H. BN. *Adansonia*, ii. t. 9, fig. 3, 4; iii. 94, 380.—*Pogopetalum* BENTH. *Trans. Linn. Soc.* xviii. 684, 42.

<sup>3</sup> Spec. about 5. WALP. *Ann.* vii. 568.

<sup>4</sup> *Fl. Owar. et Ben.* i. 85, t. 51. — DC. *Prodr.*

i. 636.—ENDL. *Gen.* n. 4671.—B. H. *Gen.* 350, n. 16.—H. BN. *Adansonia*, xi. 191.—*Stemonurus* BL. *Bijdr.* 648.—ENDL. *Gen.* n. 5496.—MIERS, *Contrib.* i. 80, t. 13-15.—*Urandra* THW. Hook. *Kew Journ.* vii. 211. — *Medusanthera* SEEM. *Journ. of Bot.* ii. 74.

<sup>5</sup> WALL. ex. LINDL. *Nat. Syst.* ed. 2, 439.—ENDL. *Gen.* n. 5497.—B. H. *Gen.* n. 17.

<sup>6</sup> Whence simulating 2 wide cotyledons.

nate entire often coriaceous; flowers in supra-axillary racemes, lateral or oppositifolious, subumbulate or 1-laterally glomeruliferous or cymiferous. (*Africa, Asia and Trop. Oceania*.<sup>1</sup>)

46. **Kummeria** MART.<sup>2</sup>—Flowers (nearly of *Lasianthera*) polygamous; calyx short, 5-dentate. Petals longer, valvate, incurved at apex, marked inside with scarcely elevated lines. Stamens 5, inserted below hypogynous disk; filaments dilated, contracted at apex above fascicle of hairs; anthers introrse versatile. Germen laterally surrounded by unequal disk, 1-locular, 2-ovulate; style dilated into a thick discoid stigmatiferous apex. Fruit drupaceous (nearly of *Lasianthera*), slightly arcuate; putamen longitudinally sulcate and costate; the dorsal costa thicker than the others,<sup>3</sup> testa of conformed seed thin; albumen fleshy longitudinally 2-partite; embryo apical very small.—A tree; leaves alternate coriaceous entire rather scabrous; flowers<sup>4</sup> in compound cymiferous axillary racemes; cymes contracted, finally after anthesis divaricate<sup>5</sup> from elongate branches. (*Guiana, Bor. Brasil*.<sup>6</sup>)

47. **Pleurisanthes**, H. BN.<sup>7</sup>—Flowers hermaphrodite or polygamous (nearly of *Lasianthera*), 4–5-merous; calyx short gamophyllous-dentate. Petals slightly longer, valvate, coadunate at apex in spuriously gamopetalous corolla circumscissous at base.<sup>8</sup> Stamens 4, 5 alternipetalous, soon deciduous; filaments subulate inserted below small annular disk; anthers introrse; cells discrete adnate rimose, finally patent. Germen sessile (in male flower effete or abortive) shortly conical, crowned at apex with shortly filiform stigmatiferous papillæ; ovules 2; one often very small or disappearing. Fruit? — A tree;<sup>9</sup> leaves alternate petiolate ovate subcoriaceous penninerved reticulate-veined; flowers<sup>10</sup> composite-racemose very crowded on lateral sometimes leaf-bearing branches;

<sup>1</sup> Spec. about 10. WIGHT, *Icon.* t. 953, 954 (*Gomphandra*).—THW. *Enum. Pl. Zeyl.* 43 (*Stemonurus*), 44 (*Plataea*).—BL. *Mus. Lugd.-Bat.* i. t. 45 (*Stemonurus*).—MIQ. *Fl. Ind. Bat.* i. p. i. 793; Suppl. i. 342, t. 2.—SEEM. *Fl. Vit.* 39, t. 12 (*Stemonurus*).—OLIV. *Fl. trop. Afr.* i. 353.—WALP. *Ann.* vii. 567.

<sup>2</sup> *Herb. Fl. Bras.* (1837), n. 1276.—*Discophora* MIERS in *Ann. Nat. Hist.* ser. 2, 118; *Contrib.* i. 105, t. 20.—B. H. *Gen.* 352, n. 23.—H. BN. *Adansonia*, xi. 194.

<sup>3</sup> Whence the fruit resembles the mericarp

of some *Umbelliferae*.

<sup>4</sup> Small, subglabrous, resembling those of *Mappia* of the same region and of some *Lasiantherae*.

<sup>5</sup> A genus very near to *Lasianthera*.

<sup>6</sup> Spec. 1. *K. brasiliensis* MART. *loc. cit.*—*Discophora guianensis* MIERS, *loc. cit.*

<sup>7</sup> *Adansonia*, xi. 200.

<sup>8</sup> As in *Ampelide*.

<sup>9</sup> Aspect of *Artocarpus*.

<sup>10</sup> Very small greenish.

branches of inflorescence linear-compressed and striate narrow fasciate; one side naked, the other bearing crowded few-flowered alternately 2-seriate sessile glomerules.<sup>1</sup> (*Guiana*.<sup>2</sup>)

48 ? **Desmostachys** PL.<sup>3</sup>—Flowers nearly of *Lasianthera*; petals linear, valvate. Stamens 5; filaments filiform or rather compressed, glabrous or very shortly pilose; anthers introrse, oblong or globose-2-dymous. Germen surrounded at base with disk 5-lobed between filaments, 2-ovulate; style slender, capitellate or truncate at apex. Fruit?—Scandent shrubs; leaves entire or sinuate, membranaceous or coriaceous; flowers small (articulate) in slender elongated interrupted spikes, terminal and solitary or axillary fasciculate.<sup>4</sup> (*Trop. West. Africa, Malasia*.<sup>5</sup>)

49. **Apodytes** E. MEY.<sup>6</sup>—Flowers nearly of *Lasianthera*; calyx small, 5-dentate. Petals glabrous, valvate. Stamens 5, alternating with petals shortly coherent or free; anthers introrse dorsifixed, at base or on both sides 2-lobed. Germen free, naked at base, incrassate or on both sides glandular-appendiculate; style excentric or oblique, whence sulcate and at base foveolate, afterwards on account of unequally accrescent subanotropous germen more or less lateral or finally subbasilar, scarcely or not at all capitellate stigmatiferous at apex; ovules 2, collaterally descendent or subsuperposed; micropyle introrse superior. Drupe subbaccate oblique, often compressed anatropous (finally apex subbasilar), at base naked or on both sides fleshy-appendiculate; putamen crustaceous or ligneous. Seed finally (from the anatropy of the pericarp) more or less ascendent; albumen copious fleshy; radicle of minute embryo (in the fruit apical) finally inferior or lateral.—Trees or shrubs; leaves alternate entire penninerved coriaceous; flowers<sup>7</sup> in corymbiform ramified cymiferous clusters terminal or axillary. (*Asia and trop Africa*.<sup>8</sup>)

<sup>1</sup> A genus, it would seem, closely allied to *Lasianthera* and *Krummeria*, its place in the order from its unknown fruit somewhat uncertain, from its inflorescence analogous to some *Artocarpus*.

<sup>2</sup> Spec. 1. *P. Artocarpi* H. Bn. loc. cit. 201.

<sup>3</sup> MIERS, *Ann. Nat. Hist. sér. 2, ix. 398*; *Contrib. i. 68, t. 9.*—B. H. *Gen. 350, n. 18.*

<sup>4</sup> A genus whose place is uncertain from its unknown fruit, seemingly near *Lasianthera*.

<sup>5</sup> Spec. 3. OLIV. *Fl. Trop. Afr. i. 353.*

<sup>6</sup> ANN. *Hook. Journ. iii. 155.*—ENDL. *Gen. n.*

5488<sup>2</sup>.—MIERS, *Ann. Nat. Hist. sér. 2, ix. 387*; *Contrib. i. 56, t. 5.*—H. Bn. *Adansonia, iii. 372.*—? *Nothapodytes* Bl. *Mus. Lugd.-Bat. i. 248.*—*Raphiostylis* PL. *Hook. Niger, 259, t. 28.*—MIERS, *Ann. Nat. Hist. loc. cit. 390*; *Contrib. i. 59, t. 6.*—H. Bn. *Adansonia, iii. 90.*

<sup>7</sup> Usually small, whitish.

<sup>8</sup> Spec. about 10. WIGHT, *Icon. t. 1153.*—*Hook. F. Hook. Icon. t. 778.*—BENTH. *Trans. Linn. Soc. xviii. 683, t. 41.*—OLIV. *Fl. Trop. Afr. i. 335.*—WALP. *Ann. vii. 567.*

50. **Anisomallon** H. BN.<sup>1</sup>—Flowers (nearly of *Apodytes*) hermaphrodite; calyx short, 5-dentate. Petals 5, 3-angular thick, valvate; ribs inwardly laminiform vertical very prominent, free acute villulose above and dividing the petals into 2 hollows, each nestling a cavity of the anther. Stamens 5, alternipetalous; filaments subulate coadunate and alternating with petals; cells of introrse anthers distinct, pendulous from connective, longitudinally rimose. Germen 1-locular, furnished at base with uni-lateral disk; ovules 2, collateral (of *Mappia*); style subulate subexcentric. Fruit drupaceous; sarcocarp thin; finally quite inverted subhorizontal, unequally 2-lobed subdidymous; one lobe remaining accrescent from drupe, the other from fleshy disk adnate to apex of a true bacciform fruit; albumen of subhorizontal seed copious fleshy; embryo minute apical.—A remarkable glabrous tree; leaves at extremities of twigs alternate petiolate oblong-elliptic or obovate entire coriaceous thick delicately pinninerved; flowers<sup>2</sup> in ramose pedunculate cymes subaxillary to uppermost leaves of twigs, articulate at concave base. (*New Caledonia*.<sup>3</sup>)

51. **Pennantia** Forst.<sup>4</sup>—Flowers polygamo-dioecious; calyx very small, dentate or annular, sometimes wanting. Petals 5, valvate. Stamens 5 alternate; filaments inserted under the small rudiment of the gynæceum, 2-plicate below apex, affixed to back of introrse anthers. Disk minute or scarcely visible. Germen 1-locular; style short, stigmatose to entire or radiate-3-lobed apex; ovule 1, descending; micropyle introrsely superior. A drupe; putamen osseous or coriaceous obliquely pervious at funicle a little below the apex; seed albuminous; cotyledons of the very short subapiculate embryo ovate, a little wider at terete radicle.—Trees; leaves alternate entire or coarsely dentate; flowers in terminal ramose-corymbiform cymes. (*Oceania*.<sup>5</sup>)

52. **Leptaulus** BENTH.<sup>6</sup>—Flowers hermaphrodite; calyx deeply 5-lobed, imbricate. Corolla gamopetalous; long (*Euleptaulus*) or more shortly (*Brachyaulus*) tubular; lobes valvate, inflexed at apex,

<sup>1</sup> *Adansonia*, xi. 195.

<sup>2</sup> For the order rather large.

<sup>3</sup> Spec. 1. *A. elusiaefolium* H. BN. loc. cit.

<sup>4</sup> *Char. Gen.* 133, t. 67.—*J. Gen.* 428.—*LAMK. Ill.* t. 854.—*POIR. Diet.* v. 152.—*ENDL. Gen.* n. 5754.—*MIEERS, Ann. Nat. Hist.* sér. 2, ix. 490; *Contrib.* i. 73, t. 11, 12.—*B. H. Gen.* 351, n. 21.—*H. BN. Adansonia*, iii. 86, 379; x. 260.

<sup>5</sup> Spec. 3, of which one is Australian, A. RICH. *Fl. N.-Zel.* 368.—*ENDL. Prodr. Fl. Norfolk*, 80; *Iconogr.* t. 121.—A. CUNN. *Ann. Nat. Hist.* iii. 248.—*REISS. Linnaea*, xvi. t. 12, 13.—*HOOK. F. Fl. N.-Zel.* i. 34, t. 12; *Man. N.-Zel. Fl.* 41, 726.—*BENTH. Fl. Austral.* i. 395.—*WALP. Ann.* i. 568.

<sup>6</sup> *Gen.* 351, n. 19.—*H. BN. Adansonia*, iii. 374; x. 264.



finally near anthesis reflexed, sometimes inwardly to the middle furnished with prominent hairy glands (*Brachyaulus*). Stamens 5, inserted slightly under the throat of the corolla; filaments short;<sup>1</sup> anthers introrse, 2-rimose; cells sometimes quite free below. Disk minute or 0. Germen 1-locular; style excentric slender more or less elongated, scarcely capitellate stigmatiferous at apex, sometimes stipate at base, with 2 glandular horns erect-conical connate within (*Brachyaulus*). Ovules in cell 2, collateral (*Mappia*). Fruit ovoid drupaceous; putamen thin; albumen copious divided into strictly adpressed corrugate lobes; embryo apical minute.—Glabrous shrubs; leaves alternate entire penninerved exstipulate; flowers lateral to leaves in contracted cymes (elevated with the branch) crowded; pedicels articulate.<sup>2</sup> (*Trop. W. Africa Malacca*.<sup>3</sup>)

53. **Gonocaryum** MIQ.<sup>4</sup>—Flowers polygamous-dioecious (nearly of *Leptaulus*); sepals 5, distinct, imbricated. Petals 5, naturally free, united in a tube (except at the apex) by means of the filaments, valvate. Stamens 5; filaments hypogynous, coalescing outwardly with margin of petals; anthers introrse oval-oblong. Germen (in male flower rudimentary) 1-locular, 2-ovulate; style acute. Fruit and seeds of *Leptaulus*.—Trees; leaves alternate, entire penninerved glabrous coriaceous pale nitid; male flowers in glomerate interrupted spikes; female and hermaphrodite few on short peduncle. (*South E. Trop. Asia*.<sup>5</sup>)

54. **Alsodeiopsis** OLIV.<sup>6</sup>—Flowers hermaphrodite (nearly of *Apodytes*); sepals 5, free lanceolate. Petals longer coalescing nearly to middle, valvate. Stamens 5, alternipetalous free; anthers ovate or elliptical-oblong minutely apiculate, introrsely rimose. Germen and ovules of *Mappia*; style slender, scarcely dilated, stigmatiferous at apex. Drupe subdry; flesh scanty; putamen thin crustaceous indehiscent; albumen of oblong seed thick fleshy; “embryo minute.”—A shrub;<sup>7</sup> leaves alternate (with strigillose-hirsute innovations)

<sup>1</sup> Inferior part much longer, quite connate with petals, and scarcely visible.

<sup>2</sup> A genus in many points approaching *Gonocaryum*; in habit, fruit, and seeds the same; it differs chiefly in its gamopetalous corolla and the mode of insertion of the stamens; in no way, however, can it be referred to any other section of the order.

<sup>3</sup> Spec. 2, OLIV. *Fl. Trop. Afr.* i. 854.

<sup>4</sup> *Fl. Ind.-Bat. Suppl.* i. 343.—KURZ, *Flora* (1870), 342.—*Phlebocalymna* GRIFF. herb. (ex B. H. Gen. 353, n. 27).

<sup>5</sup> Spec. 2, MIERS, *Ann. of Nat. Hist. sér.* 2, x. 110, 111; *Contrib.* i. 97, t. 17 (*Platea*).—H. BN. *Adansonia*, ix. 147 (*Phlebocalymna*).

<sup>6</sup> B. H. Gen. 996, n. 27 a; *Journ. Linn. Soc.* x. 43; *Fl. Trop. Afr.* i. 356.

<sup>7</sup> Habit of *Rinora* (*Alsodeiæ*).

membranous or subcoriaceous; flowers in axillary subcorymbose cymiferous pedunculate racemes. (*Trop. West. Africa*.<sup>1</sup>)

55. **Platea** BL.<sup>2</sup>—Flowers polygamous-dioecious (nearly of *Lasianthera*), 5-merous; sepals small free, imbricated. Petals valvate, caducous. Stamens 5, alternipetalous; anthers ovoid, 2-dymous. Germen and ovules of *Mappia* (or *Lasianthera*); style wide discoid dilated, sometimes oblique, stigmatiferous above and depressed at centre. Drupe oblong; putamen ligneous; embryo albuminous straight (?)—Trees; leaves alternate entire coriaceous, sometimes with the younger branches leprose-rufescent; flowers in axillary more or less ramified interrupted cymiferous racemes; female racemes much shorter. (*Ind. Arch*.<sup>3</sup>)

56. **Villaresia** R. and PAV.<sup>4</sup>—Flowers hermaphrodite or polygamous (nearly of *Gonocaryum*); sepals 5, imbricated. Petals same in number alternate, inwardly costate, imbricated or inflexo-valvate at apex. Stamens 5; filaments subulate at apex, at base complanate, alternate with petals and coherent; anthers cordate-reniform introrse. Germen of *Gonocaryum* (or *Mappia*), 2-ovulate; style short thick, stigmatose oblique recurved fimbriate at apex. Drupe oblong or ellipsoidal; putamen partly divided within by a longitudinal semiseptum; seed descendent, having a vertical process between the ventral groove; albumen fleshy corrugate; embryo minute subapical. —Trees or shrubs high scandent; leaves alternate (persistent) entire or spinulose-dentate coriaceous (lucid); flowers<sup>5</sup> in capituliform cymes, the racemes simple or ramified, axillary, lateral or terminal. (*South trop. America and Oceania*.<sup>6</sup>)

57. **Sarcanthidion** H. BN.<sup>7</sup>—Flowers hermaphrodite (nearly of

<sup>1</sup> Spec. 1. *A. Mamii* OLIV. loc. cit.

<sup>2</sup> *Bijdr.* 646; *Mus. Lugd.-Bat.* i. 249.—ENDL. *Gen.* n. 5495.—MIERS, in *Ann. Nat. Hist. sér.* 2, x. 111; *Contrib.* i. 95 (part.).—B. H. *Gen.* 353, n. 28.

<sup>3</sup> Spec. 3, 4. MIQ. *Fl. Ind.-Bat.* i. p. i. 793.—WALP. *Ann.* vii. 568.

<sup>4</sup> *Fl. Per et Chil.* iii. 9. t. 231.—A. JUSS. *Ann. Sc. Nat. sér.* 1, xxv. 14, t. 3.—ENDL. *Gen.* n. 5709.—MIERS, *Ann. Nat. Hist. sér.* 2, ix. 110.—B. H. *Gen.* 353, n. 29.—H. BN. *Adansonia*, iii. 88, 93.—*Citronella* DON. *Edinb. New Phil. Journ.* xiii. 243.—*Pleuropetalum* BL. *Mus. Lugd.-Bat.*

i. 248.—*Chariessa* MIQ. *Fl. Ind.-Bat.* i. p. i. 794.

<sup>5</sup> Rather small, white.

<sup>6</sup> Spec. ad 10. MOLIN. *Chil. ed.* 2, 293 (*Citrus*).—REISS. *Mart. Fl. Bras. Celastr.* 75, t. 22.—C. GAY, *Fl. Chil.* ii. 12.—A. GRAY, *Amer. Expl. Exp. Bot.* i. t. 27 (*Pleuropetalum*).—REG. *Gartenflora*, v. 61; vi. t. 180.—BENTH. *Fl. Austral.* i. 395.—MIERS in *Seem. Journ. of Bot.* (1864), 266, t. 21.—WALP. *Rep.* i. 541; *Ann.* ii. 181 (*Pleuropetalum*); iv. 353 (*Pleuropetalum*); vii. 568.

<sup>7</sup> *Adansonia*, xi. 199.

*Villaresia*); sepals 5, unequal, closely imbricated, decurrent-glandulose below. Petals 5, longer than calyx, free, imbricated, inflexed at apex and coalescing into a corolla spuriously gamopetalous and calyptrate cut. Stamens 5, alternipetalous; filaments hypogynous free subulate; cells of introrse anthers 2, free obliquely descending from connective, longitudinally rimose. Germen 1-locular, attenuated at apex into an arched style inwardly sulcate; summit of style unequally-capitellate stigmatiferous; ovules 2, collateral; back of germen vertically produced between the ovules into a narrow spurious septum. Fruit drupaceous oblong-ovoid, stipate with non-accrecent persistent calyx; placenta intruded within; seed hence inwardly deeply sulcate; albumen fleshy copious; embryo minute apical.—A humble or scandent glabrous shrub; leaves alternate petiolate, penninerved veined coriaceous; flowers in terminal elongated simple or scantily ramified cymiferous racemes; cymes pedunculate scorpid.<sup>1</sup> (*N. Caledonia*.<sup>2</sup>)

58. **Cassinopsis** SOND.<sup>3</sup>—Flowers hermaphrodite; lobes of gamophyllous calyx more or less deep, imbricated. Petals 5, at base subcohering together and with the stamens, free, imbricated, finally reflexed-patulous at apex. Stamens 5, alternipetalous; filaments hypogynously inserted; anthers subovate, introrsely 2-rimose. Germen 1-locular, 2-ovulate, attenuated into a short conical style subobliquely capitellate-stigmatiferous at apex. Fruit drupaceous shortly ovoid compressed apiculate; putamen crustaceous; embryo of albuminous seed apical minute.—Glabrous shrubs; <sup>†</sup> twigs slender, sometimes armed with thin axillary spines; leaves opposite, entire or serrate, glabrous; flowers in 2-parous axillary and pedunculate cymes. (*Madagascar, South Africa*.<sup>5</sup>)

59. **Grisollea** H. BN.<sup>6</sup>—Flowers diœcious; male calyx 5-partite, valvate; folioles not quite contiguous. Petals 0. Stamens 5, opposite sepals; filaments short glabrous inserted under the conical rudiment of the gynœceum subglandulous at the base hollow lacinate fimbriate

<sup>1</sup> A genus closely allied to *Villaresia* (of which perhaps it would be better considered a section) valde affine.

<sup>2</sup> Spec. 1. *S. sarmentosum* H. BN. *loc. cit.*

<sup>3</sup> *Fl. Cap.* 1, 473.—B. H. *Gen.* 354, n. 30.

<sup>4</sup> Habit of *Celastracea*. A genus imperfectly

known, often enumerated among the *Illiciæ*s.

<sup>5</sup> Spec. 2, of which one is Cape. HOCHST. *Krauss Bertr.* 42 (*Hartogia*).—TURCZ. *Bull. Mosc.* (1858), 455 (*Cassine*).—H. BN. *Adansonia*, xi. 180, n. 83.—WALP. *Ann.* vii. 569.

<sup>6</sup> *Adansonia*, iv. 211, t. 3, 4; x. 266.—B. H. *Gen.* 997, n. 30 a.

at the apex; anthers extrorse; cells longitudinally rimose. Female calyx 5-partite. Petals 5, alternate, slightly longer, at apex acute or obtuse pubescent ciliate. Stamens 5, alternipetalous sterile; filaments very short erect; anthers basifix extrorse effete. Germen inserted in pateriform central receptacle, free long exerted elongate-cylindrical straight or arched, produced to a point at the apex, surrounded at base with papillose orbicular disk; cell 1, 2-ovulate; ovules 2-nate collaterally descendent; micropyle introrse superior; funicle incrassate. Fruit (nearly of *Kummeria*) drupaceous elliptical anticipiti-compressed obscurely ribbed; flesh scanty; putamen thin hard; one seed rudimentary, the other perfect pendulous; albumen fleshy copious; cotyledons of minute subapical oblique embryo obovate shorter than conical radicle.—A glabrous tree;<sup>1</sup> leaves alternate petiolate-entire membranous or subcoriaceous penninerved; primary nerves parallel; flowers crowded axillary or terminating short axillary branches bearing 1 or 2 leaves at the base, and disposed in many times ramified cymiferous racemes. (*Malacca*.<sup>2</sup>)

## V. PHYTOCRENEÆ.

60. **Phytocrene** WALL.—Flowers diœcious; male perianth (corolla) 3, 4-partite; leaves valvate, more or less coherent at base, finally solute and slightly recurved at apex. Stamens same in number alternate; filaments free inserted round stipitate-cylindrical clavate and hispid rudiment of gynæceum; anthers introrse; cells 2, parallel discrete, inserted on margin of rectangular connective, longitudinally rimose, finally subversatile. Parts of female perianth 3, 4-valvate, more or less persistent. Staminodes same in number or 1, 2, very small dentiform alternate. Germen sessile, villose at base, 1-locular; style of germen subequal thick erect, cylindrical or subclavate villose, hollow tubular or very narrow infundibuliform, at apex stigmatose unequally capitate, 2-4-lobed or sub-2-labiate. Ovules in cell 2-nate collaterally descendent; micropyle introrse superior. Drupes  $\infty$ , collected in large globose capitule, villose or echinate; spines inserted in hollows of putamen, finally solute; putamen hard ligneous, replete at apex with resinous vesicules, at base 1-locular, 1-spermous; mesocarp

<sup>1</sup> Habit that of some *Artocarpus*.

<sup>2</sup> Spec. 1. *G. myrianthea* H. BN. loc. cit.

sometimes scantily fleshy, high produced above the putamen. Seed subpendulous; coat thin subpulpy; albumen fleshy corrugate-multilobed, granulate outside; radicle of embryo, scarcely shorter than the albumen, short conical superior; cotyledons foliaceous large, rather flat or much sigmoid-contortuplicate, digitinerved at base. High-climbing voluble shrubs often villous or hispid; wood porous filled with water; branches often aculeate; leaves alternate petiolate, entire, sinuate or palmatilobed, 3-7-nerved at base, usually reticulate veined; flowers capitate small; each involucre with cupular epicalyx at base, outwardly densely villous or rather hispid, often straight truncate at apex, outwardly 2-5-lobed or more rarely 6-10-lobed ("calyx"); capitules axillary, the supra-axillary or lateral springing from the wood; the female solitary larger pedunculate; the crowded globose or ovoid male densely packed in much ramified elongated racemes; secondary twigs each few-flowered or oftener  $\infty$ -flowered, sometimes produced beyond the flowers to a sterile bractiform point. (*Trop. Asia and Oceania.*) See p. 282.

61. **Miquelia** MEISSN.<sup>1</sup>—Flowers diœcious; leaves of male perianth 4, 5, sometimes coherent in bud, valvate. Stamens 4, 5, alternate; filaments short inserted round rudiment of gynœceum; anthers erect introrse; cells 2, discrete at base, rimose. Female perianth thicker; leaves 4, 5, valvate. Staminodes 4, 5, alternate, tongue-shaped, very short. Germen sessile; style short or subnil, soon dilated into a concave or thick discoid stigmatose cupule; ovules 2 (*Phytocrenes*); the second often abortive. Drupe oblong compressed, surrounded at base by perianth; mesocarp scanty; putamen crustaceous, outwardly and often inwardly rugose or verrucose; coat of descendent seed thin; albumen fleshy outwardly rugulose; radicle of embryo nearly equal to albumen short superior; cotyledons elliptical or ovate flat rather thickly foliaceous, digitinerved at base.—High scandent voluble shrubs; wood porous; leaves alternate membranous, entire or dentate, digitinerved at base; flowers umbellate; peduncle with 1, 2 superposed supra-axillary buds, 1-cephalous, fasciculate or

<sup>1</sup> *Gen.* 152; *Comm.* 100.—R. BR. *Bonn. Pl. Jav. Rar.* 245.—ENDL. *Gen.* n. 4564.—BL. *Rumphia*, iv. 37.—B. H. *Gen.* 354, n. 32.—H. BN. *Adansonia*, x. 262, 768; in DC. *Prodr.* xvii. 13.

—Jenkinsia GRIFF. *Calc. Journ.* iv. 231, t. 12; *Notul.* 370, t. 587.—LINDL. *Veg. King.* 531 (*Thymelacææ*).

shortly racemose; each pedicel of female flower short rather thick; of the male much elongated filiform,<sup>1</sup> articulate at base and there furnished with a short<sup>2</sup> 3-5-fid epicalyx. (*Trop. Asia and Oceania*.<sup>3</sup>)

62. **Sarcostigma** WIGHT and ARN.<sup>4</sup>—Flowers diœcious; leaves of perianth 4, 5, subpetaloid, valvate, finally patent or reflected. Stamens 4, 5, alternate; filaments short; anthers introrse subversatile. Germen (in long conoid effete male flower) 1-locular, 2-ovulate, surrounded by sterile staminodes; style very short thick depressed globose or obliquely reniform stigmatiferous. Fruit drupaceous, surrounded at base with persistent perianth; flesh scanty; putamen subligneous; testa of seed thin; cotyledons of fleshy thick exalbuminous embryo plano-convex, sheathing at base a short thick superior straight radicle.—Scandent volubile shrubs; wood rather hard; leaves alternate entire very much reticulate-veined; flowers in elongated spikes, and in them interruptedly glomerate or fasciculate; pedicels short, articulate at base, inserted in more or less prominent callus; bracts 4, 5, connate in short calyciform<sup>5</sup> subentire or unequally-dentate involucre inserted rather remotely from perianth and at base of pedicel. (*Trop. Asia and Oceania*.<sup>6</sup>)

63. **Natsiatum** HAM.<sup>7</sup>—Flowers diœcious; leaves of perianth 4-6, valvate. Stamens 4, 6, alternate (rudimentary in female flower); filaments short dilated inserted below rudiment of emarginate or obscurely lobed gynœceum; glands same in number between these; anthers introrse; cells rimose; connective produced beyond cells into a short (transparent) point. Germen sessile villous, surrounded at base with 4, 5, oppositipetalous simple or 2-nate glands, 2-ovulate; style short apical; lobes 2, 3, linear divergent; unequal-capitellate stigmatiferous at apex. Drupe unequally-ovate rather compressed; flesh scanty; putamen crustaceous; coat of descendent seed thin; albumen fleshy; radicle of subequal embryo superior conical; cotyledons orbi-

<sup>1</sup> "Corollarum tubis" (AUCT.).

<sup>2</sup> "Calyce" (AUCT.).

<sup>3</sup> Spec. about 5. WIGHT, *Ill.* ii. 62 (*Phytocrene*).—WALL. *Cat.* n. 124 (*Araliacea*).—MIQ. *Fl. Ind.-Bat.* i. p. i. 797.—BL. *Mus. Lugd.-Bat.* i. 42, t. 3.—BEDD. *Trans. Linn. Soc.* xxv. 211, t. 23.

<sup>4</sup> *Edinb. New Phil. Journ.* xiv. 299.—ENDL. *Gen.* n. 2107.—MIERS, *Ann. Nat. Hist.* ser. 2, x. 116; *Contrib.* i. 103, t. 18 (part.).—B. H.

*Gen.* 354, n. 33.—H. BN. *Adansonia*, iii. 365; x. 282; *Prodr.* xvii. 15.

<sup>5</sup> "Calycem" (AUCT.).

<sup>6</sup> Spec. 3. R. BR. *Bonn. Pl. Jar. Rar.* 241, t. 47.—MIQ. *Fl. Ind.-Bat.* i. p. i. 795.

<sup>7</sup> *Wall. Cat.* n. 4252.—ARN. *Edinb. New Phil. Journ.* xvi. 314.—ENDL. *Gen.* n. 4697.—B. H. *Gen.* 355, n. 34.—H. BN. *Adansonia*, iii. 367; x. 267; *Prodr.* xvii. 17.—*Nansiatum* HAM. (ex R. BR. *Bonn. Pl. Jar. Rar.* 245).

cular or unequal-obovate, entire or emarginate, 3-5-nerved at base. —A high scandent sarmentose shrub; wood porous; leaves alternate petiolate entire or dentate, 7-9-nerved at cordate base, acute or acuminate; flowers in supra-axillary simple or slightly ramified slender elongated racemes; each 1-bracteate; pedicel bearing below apex a short 4-6-partite membranous open calycul <sup>1</sup> scarcely removed from perianth. (*India*.<sup>2</sup>)

64. **Pyrenacantha** Hook.<sup>3</sup>—Flowers (nearly of *Natsiatum*; diœcious ecalyculate; leaves of perianth 3-5, partly free, valvate. Stamens same in number alternate (in female flower very small and sterile) inserted under the glabrous or hairy rudiment of the gynæceum; anthers introrse; connective dorsal glandulose; cells at base and apex distinct, longitudinally rimose. Germen 1-locular (of *Natsiatum*); stigma sub-sessile discoid multiradiate; ovules collateral; micropyle introrse superior obturate by hairs springing from funicle. Drupe (nearly of *Natsiatum*) rather compressed; putamen outwardly rugulose, inwardly spinulose- verrucose, 1-spermous; cotyledons of albuminous embryo large foliaceous, 3-5-nerved at base. —Scandent shrubs or undershrubs; branches slender; leaves alternate petiolate, pilose or rather scabrous, entire, dentate, or lobed, 3-5-nerved at base; flowers in supra-axillary spikes, with 1, 2 superposed gemmules; male long filiform; female spicato-capitate or by abortion 1-flowered, naked at base.<sup>4</sup> (*Trop. and South Africa, India*.<sup>5</sup>)

65. **Chlamydocarya** H. Bn.<sup>6</sup>—Flowers diœcious; male ...?; female 4-merous (nearly of *Pyrenacantha*); leaves of perianth sub-free or connate at base, reflexed at apex. Staminodes 4, alternate. Germen sessile, 1-locular, 2-ovulate; style short thick tubular afterwards cut in  $\infty$  linear erect stigmatiferous lobes. Drupe unequally compressed, adnate to middle with cupuliform accrescent receptacle, otherwise free and enclosed within and crowned with persistent peri-

<sup>1</sup> "Calyceum" (Auctt.).

<sup>2</sup> Spec. 1? *N. herpeticum* HAM. loc. cit.—Miq. *Fl. Ind.-Bat.* i. p. i. 797 (*Nausiatum*).—WALP. *Rep.* i. 98.—*Sycios pentandrus* WALL. *Cat.*

<sup>3</sup> *Bot. Misc.* ii. 107, t. Suppl. 10; *Niger*, 15. —ENDL. *Gen.* n. 1893.—TUL. *Ann. Sc. Nat.* sér. 3, xv. 251 (*Pyrenacanthus*).—H. Bn. *Bull. Soc. Bot. de Fr.* iv. 991; *Et. Gén. Euphorb.* 662; *Prodr.* 18.—*Adelanthus* ENDL. *Gen.* n. 6839; *Suppl.* ii. 31.—H. Bn. *Euphorb.* 662.—*Cavanilla* THUNB. *Prodr.* 31.—*Moldenhauera* SPRENG.

*Syst.* i. 373 (not SCHOTT).—*Sardum* SOLAND. MSS. (ex H. Bn. *Prodr.*).

<sup>4</sup> A genus very near *Natsiatum*, scarcely differing excepting in its ecalyculate flowers, and perhaps better referred to a section of that genus. (H. Bn. *Prodr.* loc. cit.)

<sup>5</sup> Spec. about 6. HARV. *Thes. Cap.* i. 12, t. 23. —SOND. *Linnaea*, xxiii. 107.—H. Bn. *Adansonia*, x. 270.

<sup>6</sup> *Adansonia*, x. 276; *Prodr.* 20.

gynous perianth, accrescent in sacciform gamophyllous calyptra conical or long produced beyond pericarp in tube 4-dentate at apex, style apiculate, outwardly rugose-setaceous; mesocarp thin; putamen outwardly rugose-setaceous; mesocarp thin; putamen outwardly foveolate, inwardly produced into woody prickles penetrating the seed; seed and embryo of *Pyrenacantha*.—Scandent hirsute shrubs; leaves alternate simple petiolate penninerved; female flowers capitate or shortly spicate; receptacle of capitule hard thick; capitules pedunculate lateral solitary or racemose; bracts longer than flower reflexed.<sup>1</sup> (*Trop. Africa*.<sup>2</sup>)

66. **Iodes** BL.<sup>3</sup>—Flowers dioecious ecalyculate (*Gymniodes*<sup>4</sup>) or oftener calyculate (*Eviodes*,<sup>5</sup> *Lasiodes*<sup>6</sup>); lobes of gamophyllous perianth sometimes (*Lasiodes*) surrounded at base by a dense crown of hairs, 3 or oftener 4, 5, valvate, outwardly densely villous, finally expanded, reflexed or revolute persistent round fruit. Stamens 3–5, alternate; filaments free, sometimes complanate, usually short, inserted below rudiment of gynæceum; anthers straight (*Lasiodes*, *Eviodes*) or more rarely (*Gymniodes*) cochleate-reflexed, introrse, 2-rimose. Germs inserted in dilated receptacle 2-ovulate; obturator small; style sessile, afterwards thick discoid dilated or subreniform; concave radiate-∞-sulcate at apex, more rarely laterally obovate excentric. Drupe surrounded at base by perianth and sometimes by calycul; mesocarp thin; seed albuminous; cotyledons of embryo rising one half above the albumen, foliaceous; radicle short superior.—Shrubs; usually high scandent, villous or tomentose; leaves opposite entire penninerved; inflorescence pedunculate cymose-racemose; male flowers very ramose abundant; peduncles axillary or with 1, 2 buds elevate-supra-axillary sometimes lateral to leaves, slender or thick ligneous; inferior often changed into tendrils; flowers (small) villose-ciliate articulate at summit of pedicel, or calyculate (*Eviodes*, *Lasiodes*); epicalyx minute unequally-dentate, or (*Gymniodes*) ecalyculate. (*Asia, Oceania and Trop. Africa and Madagascar*.<sup>7</sup>)

67 ? **Cardiopterys** WALL.<sup>8</sup>—Flowers hermaphrodite regular;

<sup>1</sup> A genus differing mainly from allied *Pyrenacantha* by inferior fruit, enclosed by accrescent perianth.

<sup>2</sup> Spec. 2. OLIV. *Fl. Trop. Afr.* i. 359 (*Phytocrene* ?).

<sup>3</sup> *Bijdr.* 29.—R. BR. in *Benn. Pl. Jav. Rar.* 243, t. 48.—ENDL. *Gen.* n. 4689.—B. H. *Gen.* 355, n. 35.—H. BN. *Adansonia*, iii. 364; x.

262; *Prodr.* 22.

<sup>4</sup> H. BN. *Prodr.* 23, sect. 2.

<sup>5</sup> H. BN. *Adansonia*, x. 267; *Prodr.* sect. 1.

<sup>6</sup> H. BN. *Adansonia*, x. 268; *Prodr.* sect. 3.

<sup>7</sup> Spec. ad. 6 PL. *Hook. Journ.* v. 247 (*Nan-siatum*).—Miq. *Fl. Ind.-Bat.* i. p. i. 795.—OLIV. *Fl. Trop. Afr.* i. 358.—H. BN. *Adansonia*, ix. 146.

<sup>8</sup> *Cat.* n. 8033.—LIND. *Introd.* 82.—R. BR.



lobes of calyx (?) 4-5-merous connate at base, imbricated. Corolla gamopetalous subcampanulate, inserted slightly higher than calyx (at summit of short internode); lobes imbricate, finally patent. Stamens 4, 5, alternipetalous, inserted at base of corolla; filaments short; anthers introrse 2-rimose. Germen free, 1-locular; ovule 1, descendent; mycropyle introrse superior; style excentric inserted slightly below the rather prominent apex of germen, subcapitate stigmatiferous at apex. Fruit oboval-oblong, emarginate at apex, indehiscent, longitudinally 2-winged; wings marginal transversely striolate nitid; nucleus linear. Seed subpendulous linear-elongate sulcate; coat very thin; embryo verysmall conical inverted within apex of very densely fleshy-granular albumen.—An herb, sometimes suffrutescent at base, volubile glabrous; juice milky; leaves alternate, petiolate wide cordate, entire or lobed, membranous, digiti- or pedati-nerved at base; flowers <sup>1</sup> in furcate cymiferous axillary racemes, 2-chotomous or paniculate, secund, sessile ebracteate, articulate at concave base by a small process of branch. (*Trop. Asia*,<sup>2</sup> *Indian Arch.*<sup>3</sup>)

in *Benn. Pl. Jav. Rar.* 246, t. 49.—*ENDL. Gen. n.* 3888<sup>o</sup>.—*B. H. Gen.* 355, n. 36.—*H. BN. Adansonia*, x, 279; *Prodr.* 25.—*Peripterygium* *HASSK. Cat. Hort. Bog.* 234.—*H. BN. Euphorb.* 668.—*Sioja* *HAM. (ex LINDL. loc. cit.)*.

<sup>1</sup> Small, white.

<sup>2</sup> A genus of doubtful place, perhaps on account of its hermaphrodite flowers, with apparently a true calyx, better referred to *Mappia*.

<sup>3</sup> Spec. 1 (according to various authors 4, 5), *Scil. C. Rumphii* *H. BN. Adansonia*, x, 280. which is *Olus sanguinis* *RUMPH. Herb. Amboin.* v, 482, t. 180.—*Dioscorea sativa* *L. Amœn.* iv, 133.—*W. Sp.* iv, 895.—*Cardiopterys moluccana* *BL. Rumphia* iii, 207, t. 177.—*C. lobata* *R. Br. loc. cit.*; in *Cat. Wall.* n. 8033.—*C. suhamata* *WALL.*—*Sioja sanguinaria* *HAM.*—*Peripterygium quinquelobum* *HASSK.*

## XLIII. SAPINDACEÆ.

### 1. STAPHYLEA SERIES.

We commence the study of this group by the analysis, not of a *Staphylea* (fig. 335, 339-351), but rather of a *Triceros*,<sup>1</sup> whose flowers (fig. 336) are regular, hermaphrodite, with a receptacle in the form of a cup of little depth. The edges bear five sepals and an equal number of perigynous petals, both imbricate, five alternipe-

*Staphylea pinnata*.

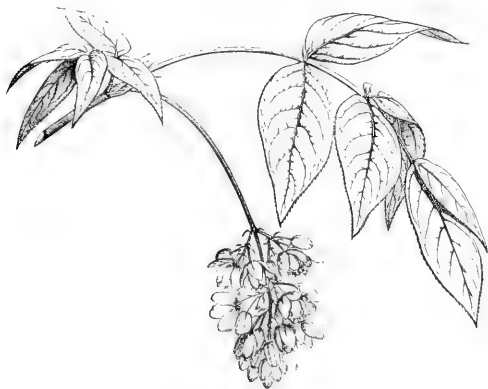


Fig. 335. Floriferous branch.

talous stamens, also perigynous, each formed of a free thread and a bilocular introrse anther dehiscing by two longitudinal clefts, and also inserted perigynously. In the interior the glandular disk lining the concavity of the receptacle is prolonged in a circular rim, nearly entire. In the concavity of the receptacle, below the perianth and

<sup>1</sup> LOUR. *Fl. Cochinch.* (éd. 1790), 184.—DC. et Zucc. *Fl. Jap.* i. 124, t. 67.—ENDL. *Gen. n. Prodr.* ii. 89 (*Terebinthac. dub.*).—ENDL. *Gen. n.* 5672.—B. H. *Gen.* 412, n. 72.  
5945.—B. H. *Gen.* 418, 439.—? *Euscaphis* SIEB.

the gynæceum, three carpels are inserted obliquely, free on their interior edge and each formed by an unilocular ovary tapering into an apiculate style whose slightly dilated stigmatiferous apex often adheres to the stigmas of the two other carpels. In the internal angle of each ovary is seen a placenta supporting four ovules, arranged in two vertical ascendent series, with the micropyle turned

*Triceros japonica*.<sup>1</sup>



Fig. 337. Longitudinal section of fruit.



Fig. 336. Longitudinal section of flower (¾).



Fig. 338. Longitudinal section of seed (¼).

downwards and outwards. There are flowers whose gynæceum is formed of only two carpels. The fruit (fig. 337) is, accordingly, composed of two or three independent, folliculiform, divergent, coriaceous carpels, each opening slowly inwardly to set at liberty from one to four seeds. These (fig. 338) present beneath their double coat, the exterior of which is fleshy and the interior crustaceous, a fleshy albumen surrounding an embryo with inferior radicle and large orbicular flattened cotyledons. In certain species of the same genus, indicated under the name of *Turpinia*,<sup>2</sup> the carpels are independent only in the upper portion and not towards the base. The pericarp, generally indehiscent, is more or less thick, coriaceous or even fleshy. In all the *Triceros*, however, the number of ovules is variable in each series, reduced even sometimes to one. There are ten species<sup>3</sup> of this genus, arborescent or frutescent, growing in tem-

<sup>1</sup> *Sambucus japonica* THUNB. *Fl. Jap.* 125.—*Ailantus japonica* BL. herb!—*Staphylea heterophylla* RÆM. & SCH.—*Euscaphis staphyleoides* SIEB. ZUCC. loc. cit.—Miq. *Mus. Lugd.-Bat.* iii, 92.

<sup>2</sup> VENT. *Choix de Pl.* t. 31.—DC. *Prodr.* ii. 3.—TURP. *Dict. Sc. Nat.* Atl. t. 273.—ENDL. *Gen.* n. 5671.—B. H. *Gen.* 413, 1000, n. 73.—*Dalrympea* ROXB. *Pl. Coromand.* iii. 75, t. 279.—

*Lacpedea* H. B. K. *Non. Gen. et Spec.* v. 142, t. 444.—ENDL. *Gen.* n. 5703.—*Triceraria* W. RÆM. & SCH. *Syst.* iv. 803.—*Ockranthe* LINDL. *Bot. Reg.* t. 1819.—ENDL. *Gen.* n. 5474.—*Egyrea* CHAMP. *Hook. Kew Journ.* iii. 331.

<sup>3</sup> WIGHT, *Icon.* t. 972 (*Turpinia*).—TUL. *Ann. Sc. Nat.* sér. 3, vi. 361 (*Turpinia*).—GRISEB. *Fl. Brit. W.-Ind.* 128.—Miq. *Fl. Ind.-Bat.* i. p. ii.

perate and tropical Asia, the Indian Archipelago, and South America. The leaves are opposite, glabrous stipulate or exstipulate simple or more usually imparipinnate, with coriaceous, serrulate folioles. The flowers are collected in biparous compound cymes, axillary or terminal.

In *Staphylea*<sup>1</sup> (fig. 335, 339-341), the perianth and andrœceum are the same as in the preceding genus, but inserted on a receptacular cup of less depth, lined by a more or less distinct disk interior

*Staphylea pinnata.*

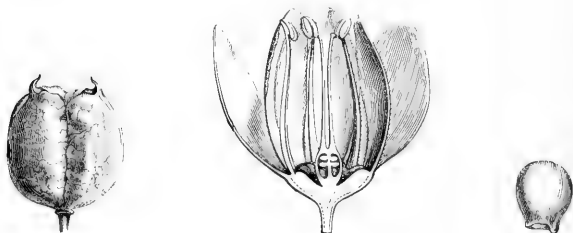


Fig. 340. Fruit (½).      Fig. 339. Longitudinal section of flower (½).      Fig. 341. Seed.

to the stamens. The ovary has two or three cells, sometimes united, sometimes independent for a variable extent in the upper part, and their ascendent biseriate ovules are variable in number, often indefinite, in the interior angle of each of them. The fruit is capsular, membranous and vesiculate, dehiscing by the superior and interior part of the cells. The seeds contain under their very thick coats an albuminous embryo. Three or four<sup>2</sup> species of *Staphylea* are known, shrubs of the temperate regions of Europe, Asia, and North America, with opposite stipulate leaves, compound 3-5-foliate or impari-

593.—WALP. *Rep.* i. 528 (*Turpinia*); ii. 826 (*Euscaphis*); v. 401; *Ann.* i. 188.

<sup>1</sup> L. *Gen.* n. 374.—J. *Gen.* 377.—LAMK. *Ill.* t. 210.—POIR. *Dict.* vii. 390.—GERTN. *Fruct.* i. 334, t. 69.—DC. *Prodr.* ii. 2.—SPACH. *Suit.* à Buffon, ii. 394.—ENDL. *Gen.* n. 5673.—PAYER, *Organog.* 171, t. 36.—B. H. *Gen.* 412, n. 71.—H. BN. in *Payer Fam. Nat.* 319.—*Staphyloedron* T. *Inst.* 616, t. 386.—*Bumalda* THUNB.

*Fl. Jap.* 8.

<sup>2</sup> DUHAM, *Arbr.* ii. 77.—DELESS,  *Ic. Sel.* iii. t. 51.—REICHB.  *Ic. Fl. Germ.* v. t. 161.—GREN. et GODR. *Fl. de Fr.* i. 332.—TORR. *Fl. N.-York.* t. 19.—A. GRAY, *Gen. Ill.* t. 172.—TUL. *Ann. Sc. Nat.* sér. 3, vi. 362.—BENTH. *Fl. Hongk.* 45. MIQ. *Ann. Mus. Lugd.-Bat.* iii. 93.—WALP. *Rep.* i. 529; *Ann.* ii. 262; vii. 638.

pinnate. The flowers are arranged in axillary clusters, simple or ramified, with articulate pedicels.

## II. SABIA SERIES.

*Sabia*<sup>1</sup> (fig. 342, 343) has flowers generally hermaphrodite. The convex receptacle usually bears five imbricate sepals, five petals superposed to the sepals and imbricated like them, and five oppositi-

*Sabia lanceolata*.



Fig. 342. Longitudinal section of flower (3).

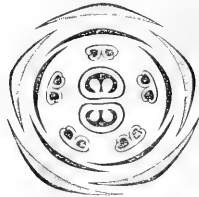


Fig. 343. Diagram.

petalous stamens, each formed of a free filament and an anther often introrse, with cells didymous or adnate to the basifixed connective, dehiscent close to the edge of it by a longitudinal cleft. The filaments are inserted at the base of a cylindrical foot supporting the gynæceum, and thickened in the intervals of the stamens into five projecting ribs whose upper part sometimes projects upwards in the manner of an alternipetalous gland. There are flowers in which the perianth and androecium are tetramerous. The gynæceum is free, formed of two or, more rarely, three independent carpels brought together and often adhering at the internal angle; they are each composed of an unilocular ovary, tapering upwards in a slender style, obtuse stigmatiferous at apex. In the interior angle of each ovary is seen a lon-

<sup>1</sup> COLEBR. in *Trans. Linn. Soc.* xii, 355, t. 14.  
—ENDL. *Gen.* n. 5927.—PL. *Ann. Sc. Nat. sér.*  
4, iii, 296.—B. H. *Gen.* 414, n. 1.—*Meniscota*  
BL. *Bijdr.* 28.—ENDL. *Gen.* n. 4688 (*Menisper-*

*maceæ*).—*Enantia* FALCON. in *Hook. Journ.* iv.  
75 (not OLIV.).—*Androglossa* BENTH. *Hook. Kew*  
*Journ.* iii, 42.

gitudinal placenta supporting two collateral or nearly superposed ovules, more or less ascendent, anatropous, with the raphe turned inwards, and the micropyle downwards and outwards. The fruit is formed of one, two, or three gibbous drupes with a stone more or less rugose and reticulate outwardly, and covered by a sarcocarp of variable thickness. In each stone is found two or, more often, one ascendent, reniform seed, with albumen of little thickness or reduced to a simple membrane, enveloping a curved embryo, having lateral cotyledons, rugose or waved, with inferior and incurved radicle. The *Sabias* are sarmentous and climbing shrubs, natives of warm and temperate Eastern Asia. The branches bear shoots with imbricate persistent scales, first appendages of the foliate branches. The leaves are alternate, entire, penninerved. The flowers,<sup>1</sup> usually opening early, are arranged in axillary clusters, pedunculate, simple, or ramified, sometimes even corymbiform or simulating cymes. Ten species have been described.<sup>2</sup>

*Meliosma*<sup>3</sup> (fig. 344-350) is allied to *Sabia*, although immediately distinguished by the union of the carpels in an ovary with two or

*Meliosma Arnottiana.*



Fig. 344. Bud (♂).



Fig. 345. Flower.



Fig. 346. Longitudinal section of flower.

three biovulate cells, and by the interior appendages with which the petals are provided. These are three in number, valvate or, much oftener, imbricate. There has frequently been described as fourth and fifth petals<sup>4</sup> a simple or double tongue borne on the back

<sup>1</sup> Small or medium, whitish.

<sup>2</sup> WALL. *Rorb. Fl. Ind.* ii. 308.—HOOK. F. & THOMS. *Fl. Ind.* i. 206.—MIQ. *Fl. Ind.-Bat.* i. 209; Suppl. i. 520; t. 44.—BENTH. *Fl. Hongk.* 70.—WALP. *Ann.* iv. 138; vii. 639.

<sup>3</sup> BL. *Fl. Jav. Pref.* 7.—ENDL. *Gen.* n. 5639.—PATER. *Bull. Soc. Bot. de Fr.* v. 21.—B. H. *Gen.* 414, n. 2.—MILLINGTONIA ROXB. *Fl. Ind.* 102

(not L.).—*Oligostemon* TURCZ. *Bull. Mosc.* (1858), i. 447.—*Lorenziana* LIEBM. *Vidd. Medd. Kjob.* (1850), 67.—*Kingsboroughia* LIEBM. *loc. cit.* 69.—PL. *Ann. Sc. Nat. sér. 4*, iii. 295.—*Llavea* PL. *Fl. des serres*, v. n. 300 (incl.: *Ophiocaryon* SCHOMB. (?), *Phoranthus* BENTH.).

<sup>4</sup> Looking at it in this way there would be as many petals as sepals, two of these, more

of the staminal filament. These are two or three in number,<sup>1</sup> alternate with the large petals; they are remarkable for a sort of dilatation of the connective which surrounds to a greater or less height the two poricidal cells of the anther. The fruit of *Meliosma* is a monospermous drupe. The exalbuminous seed contains an embryo with cotyledons more or less contortuplicate or spirally rolled and

*Meliosma Arnottiana.*



Fig. 348. Stamen, front.



Fig. 347. Petal lined by an appendage.



Fig. 349. Stamen, back.



Fig. 350. Disk and gynaecium.

having a curved or flexuous radicle. This attains a very large development in a species with large fruit,<sup>2</sup> from Guiana, of which the genus *Ophiocaryon*<sup>3</sup> has been made, and in which the style is very short, so that each of its two ovary cells is surmounted by a small stigmatiferous lobe. In another species from the same country, distinguished under the generic name of *Phoxanthus*,<sup>4</sup> the fruit is also voluminous, and the petals are very elongated and acute. On the whole, the genus *Meliosma*, such as we limit it, contains twenty species,<sup>5</sup> three or four being American, all the others belong to the tropical and sub-tropical regions of Asia and Oceania. They are trees or shrubs, with alternate leaves, simple or compound-pinnate; the

exterior than the others, having been considered by certain authors as bracts applied outside the calyx.

<sup>1</sup> With the other interpretation, the squamules interior to the petals would represent staminodes, and then the number of pieces of the androecium (sterile and fertile) would be equal in number to those of the petals.

<sup>2</sup> Perhaps they are tardily and incompletely dehiscent, following a small longitudinal ridge they bear on one side.

<sup>3</sup> SCHOMB. *Ann. Nat. Hist.* v. 202.—LINDL. *Veg. Kingd.* 383, fig. 268.—ENDL. *Gen.* n. 5926<sup>1</sup>.

—BENTH. *Hook. Lond. Journ.* iv. 376.—PL. *F. des Serres*, v. n. 300; *Ann. Sc. Nat.* sér. 4, iii. 295.—B. H. *Gen.* 415, n. 4.

<sup>4</sup> BENTH. *Trans. Linn. Soc.* xxii. 127, t. 23, 24.—B. H. *Gen.* 414, n. 8.

<sup>5</sup> BL. *Rumphio*, iii. t. 168, 169.—WIGHT, *Ill.* t. 53; *Icon.* t. 964.—SCHULT. *Linnaea*, xvi. 395.—GRISEB. *Cat. Pl. Cub.* 46.—TRW. *Enum. Pl. Zeyl.* 408.—Miq. *Fl. Ind.-Bat.* i. p. ii. 612; Suppl. i. 520; in *Ann. Mus. Lugd.-Bat.* iii. 93.—WALP. *Rep.* i. 423; *Ann.* i. 135; ii. 224; iii. 834; iv. 381 (*Lorenzana*); vii. 640.

two arrangements may even, as in *Phoranthus*, be met with in one and the same species. The flowers, small and numerous, are collected in very ramified compound clusters; they are pretty frequently polygamous.

### III. SAPINDUS SERIES.

In *Sapindus*<sup>1</sup> (fig. 351–353), the flowers are regular, hermaphrodite or polygamous, often with four, more frequently with five parts. The convex or slightly depressed receptacle supports, in the latter

*Sapindus arborescens.*

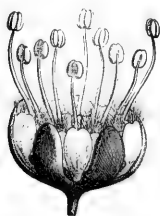


Fig. 351. Flower ( $\frac{2}{3}$ ).



Fig. 352. Longitudinal section of flower.

case, a calyx with five imbricate sepals, equal or unequal, and a corolla of five alternate petals, equally imbricated or twisted, naked internally or furnished at the point of junction of the claw and limb, with a simple or double petaloid appendage. Inside the petals is seen a circular disk in the shape of a glandular pad surrounding the stamens. These are often ten in number, superposed, five to the sepals and five smaller ones to the petals, each formed by an hypogynous or slightly perigynous free filament, and a bilocular introrse anther dehiscing by two longitudinal clefts.<sup>2</sup> The gynæceum, rudimentary in the male flowers, is free, formed of an ovary often with

<sup>1</sup> *Sapindus* PLUM. (ex T. *Inst.* 659, t. 440).—L. *Gen.* n. 449.—ADANS. *Fam. des Pl.* ii. 343.—J. *Gen.* 247.—GERTN. *Fruct.* i. 341, t. 70.—LAMK. *Ill.* t. 307.—POIR. *Diet.* vi. 662; Suppl. v. 72.—DC. *Prodr.* i. 607.—CAMBESS. *Mém. Mus.* xviii. 56.—SPACH, *Suit. à Buffon*, iii. 52.—ENDL. *Gen.* n. 5610.—A. GRAY, *Gen. Ill.* t. 180.—H.

BN. *Payer Fam. Nat.* 315.—B. H. *Gen.* 404, n. 43.—*Aphania* BL. *Bijdr.* 236.—ENDL. *Gen.* n. 5615.—Miq. *Fl. Ind.-Bat.* i. p. ii. 52.—*Didymococcus* BL. *Rumphia*, iii. 103.

<sup>2</sup> H. MOHL (*Ann. Sc. Nat.* sér. 2, iii. 337) describes the pollen as: "plat, triangulaire; sur les angles des papilles, des lignes légères



three uniovulate cells, more or less separated from each other above and outwardly, surmounted by a style divided at its summit into three stigmatiferous lobes. The ovule, inserted near the base of the internal angle of each cell, is ascendent, anatropous, with the micropyle inferior and exterior.<sup>1</sup> In the ripe fruit usually only one of the cells is developed into a fleshy or coriaceous pericarp, indehiscent, globular or nearly so, accompanied at the base by the undeveloped carpels, and containing an ascendent seed, whose coats cover a large fleshy bent embryo with thick cotyledons and a short inferior radicle. In the other species of *Sapindus*, there are only eight or nine stamens or a still smaller number, those in front of the petals disappearing more or less completely; the carpels are two or four in number, and several of them may be developed into a ripe fruit and contain a perfect seed. The species of *Sapindus* are trees or shrubs forty in number,<sup>2</sup> inhabiting all the warm regions of the globe. The leaves are alternate, compound-imparipinnate or reduced to a single foliole. The flowers are arranged in axillary or terminal clusters, simple or, more often, more or less ramified.

The *Euphorbia* (fig. 354, 355) are analogous to *Sapindus*, with the same free or imbricate sepals, the same disk and interior androecium. But the petals equal in number to the sepals or fewer (sometimes completely suppressed) have no interior appendage. The gynæceum, more or less developed in the male flower, has an ovary with uniovulate cells, more or less projecting, with an ovule of *Sapindus* in each cell, and a style inserted inside these. The fruit is formed of one or, more rarely, of several crustaceous, smooth or tuberculous

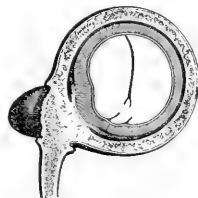
*Sapindus Saponaria.*

Fig. 353. Longitudinal section of fruit.

qui suivent les angles et indiquent une tendance à la formation de plis (*S. emarginatus*, *Cupania venulosa*)."

<sup>1</sup> There are two coats.

<sup>2</sup> A. S. H. *Pl. Us. Bras.* t. 68; *Fl. Bras. Mer.* i. 389, t. 81.—WIGHT et ARN. *Prodr.* i. 110.—DELESS.  *Ic. Sel.* iii. 22, t. 38.—WIGHT, *Ill.* t. 51.—TURCZ. in *Bull. Mosc.* (1858), i. 401.—BL. *Rumphia* iii. 92.—Miq. *Fl. Ind.-Bat.* i. p. ii.

551; Suppl. 198, 508; *Mus. Lugd.-Bat.* iii. 92.—GRISEB. *Fl. Brit. W.-Ind.* 126.—THW. *Enum. Pl. Zeyl.* 55.—TR. et PL. *Ann. Sc. Nat.* sér. 4, xviii. 377.—BENTH. *Hook. Kew Journ.* iii. 127; *Fl. Austral.* i. 464.—A. GRAY, *Amer. Expl. Exp. Bot.* i. 251.—HARV. et SOND. *Fl. Cap.* i. 240.—BAKER, *Oliv. Fl. Trop. Afr.* i. 430.—KL. *Pet. Moss. Bot.* i. 119.—WALP. *Rep.* i. 416; v. 362; *Ann.* i. 134; ii. 211; iv. 378; vii. 629.

berries each containing a seed enveloped by a thick aril, fleshy or pulpy, and whose exalbuminous embryo has thick plano-convex cotyledons. It consists of trees with imparipinnate leaves, natives of tropical

*Euphoria Longana.*



Fig. 354. Inflorescence.



Fig. 355. Male flower ( $\frac{3}{4}$ ).

Asia and Oceania. *Nephelium* (fig. 356–360), growing in the same regions, has the same general organisation, but the leaves are usually paripinnate, and the calyx, instead of being formed of free sepals, becomes gamosepalous, in the form of a shallow cup dentate on the edges. The

petals are variable in number, destitute of appendages, or completely wanting, and the stamens are generally exserted in the male flowers. The fruit

in the *Nephelium* proper or *Scytalia* (fig. 356, 357) is like that of *Euphoria*, and does not open, or dehisces tardily and in an irregular manner, to liberate a seed completely surrounded by a large fleshy sacciform aril (fig. 357, 358), whose cotyledons are plano-convex, or more or less

*Nephelium (Scytalia) Litchi.*



Fig. 356. Fruit.



Fig. 358. Seed with aril.

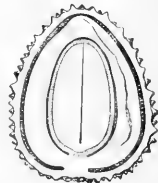


Fig. 357. Longitudinal section of fruit.

folded back upon themselves. In a *Nephelium* of Mauritius, from which the genus *Stadmania* has been made, the fruit opens a little more regularly, usually following its length and in two nearly equal valves. The seed is totally enveloped by an aril, and the embryonic radicle is folded back on the cotyledons. In the *Cubillas*, species from the Indian Archipelago, which there seems no reason for

placing in a different genus to *Stadmania*, the fruit is formed of one to three berries also opening longitudinally, but they are loaded with tubercles or prickles and the seed is only incompletely surrounded by the aril. The *Spanogheas*, Asiatic species, can no longer be separated generically from *Nephelium*. The fruit, more or less deeply lobate, is indehiscent or opens crossways or obliquely at maturity. The aril only partially envelopes the seed, and the embryo is bent.

*Pometia* also constitutes according to us a section of the same genus. The flowers have from four to eight stamens and a fruit whose seed, surrounded by a mucous aril, contains a conduplicate embryo. Like all the species of *Nephelium* which have been

enumerated, these trees from India and the isles of the Pacific Ocean have compound-pinnate leaves, whose inferior folioles are but little developed, orbicular, stipuliform. In the *Pappæas*, on the contrary, plants from the Cape of Good Hope, whose flowers are also those of *Nephelium*, and which we also include in that genus, the leaves are simple, and the seeds loosely surrounded by an aril (fig. 359, 360) have a conduplicate or convoluted embryo. *Zerospermum*, a tree from the Indian Archipelago, may be defined as a *Nephelium* with tetramerous flowers, thick and developed stigma, and fruits whose tubercular berries contain an exarillate seed. In *Deinbollia*, consisting of trees, often hairy, from tropical Western Africa, the flowers, constructed like those of *Euphoria*, with large imbricate sepals, have expanded petals, lined inwardly by scale or bunch of hairs, and usually from twelve to twenty-five stamens. The 1-3-lobate fruit, the seed and the aril are those of *Nephelium*. *Podonephelium*, a tree from Oceania, is an apetalous *Nephelium* whose carpels are borne at the summit of a long and thick gynophore. The *Heterodendrons*, Australian shrubs, have also the flowers of *Nephelium*, apetalous, with 6-15 stamens and a 2-4-locular ovary, a dry fruit, lobate, and arillate seeds, containing an embryo with flexuous cotyledons. But their aspect is that of an Olive; they have simple or pinnate leaves, coriaceous, linear, or oblong, and flowers arranged in solitary or double clusters. In the *Capuras*,

*Nephelium (Pappæa) capense.*



Fig. 359. Seed ( $\frac{1}{2}$ ).



Fig. 360. Longitudinal section of seed.

Javanese and Malay trees or shrubs, the flowers, regular, 4-5-merous, are also very nearly those of *Euphorbia*; they have from six to nine stamens, an ovary with three or four cells, surmounted by a style immediately branching out into three or four radiated stigmatiferous lobes, and the fruit is sometimes divided into lobes, sometimes entire and dehiscent in several berries. The arillate seeds have a thick and fleshy embryo, with unequal and superposed cotyledons. The leaves are pinnate with a stem often winged with opposite folioles, sessile, often punctate and the inferior ones remain small and stipuliform, like those of *Pometia*.

The *Cupania* (fig. 361, 362) give their name to a sub-series in which the fruit appears to be

*Cupania (Matayba) guianensis.*



Fig. 361. Flower ( $\frac{1}{4}$ ). Fig. 362. Longitudinal section of flower.

always capsular, dehiscing by a number of longitudinal clefts equal to that of the carpels entering into the constitution of the gynæceum. Around the circular disk is found a regular calyx whose pieces are more or less imbricate, and sometimes valvate or nearly so. The stamens are short or nearly enclosed, or long exserted. The latter occurs

in the *Matayba*, without however serving to separate them generically from *Cupania*, on account of the numerous intermediate arrangements met with. There are species of *Cupania* in all the tropical regions of both worlds, principally in South America. - *Eriocælum* is closely allied, but in this five sepals are valvate or nearly so, and the stamens, eight to ten in number, correspond to as many radiating grooves, separating from one another the lobes of a large and double disk surrounding their gynæceum. They are trees from western tropical Africa. *Crossonephelis*, a small tree with paripinnate leaves, has tetramerous and apetalous flowers whose calyx is valvate, and whose large disk is divided into five alternate lobes. This disk is reflexed, after the manner of a gamopetalous corolla, short and thick, in the female flower, whose gynæceum is formed of two carpels. The four oppositisepalous stamens which accompany it are sterile in the female flower, and provided with an introrse anther in the male flower.

The *Talisias* are also closely allied to *Cupania*. They have the imbricated corolla, but their five leaves are lined by a simple or

bifid plate, loaded with bushy and upright hairs. The ovary has three cells surmounted by a style with trilobate stigmatiferous apex, to which succeeds an ovoid, acuminate achene. The *Tulisia* are trees from tropical America, with compound pinnate leaves. *Lecaniodiscus*, inhabiting western tropical Africa, has flowers regular or nearly so, gamosepalous imbricate calyx, and no corolla. The disk, traversed inwardly by ten radiating grooves, like that of *Eriocælum*, surrounds an equal number, or nearly so, of stamens with elongated anthers; and the trimerous gynæceum becomes a drupaceous fruit, but little fleshy, or an achene analogous to that of *Tulisia*. The *Jageras*, trees from the Indian Archipelago, have from three to five imbricate sepals, an equal number of imbricate petals and eight stamens interior to the disk. The petals are lined by a cucullate scale. All these characters give them a great resemblance to *Cupania*, *Nephelium*, and *Sapindus*, but their entire fruit is analogous to that of the *Tulisia* and *Lecaniodiscus*, more fleshy, and with three or four cells each containing an exarillate seed. *Lepisanthes* have very nearly the same flowers, with four or five parts, an imbricate perianth and petals lined by an entire or bilobate cucullate scale. But the equally entire fruit has two or three indehiscent cells, and is a drupe with more or less slight mesocarp; this genus, formed of trees from the Indian Archipelago and Timor, with pari- or impari-pinnate leaves, is then closely allied to the preceding. It is the same with *Anomosanthes*, whose flower is organised like it, but whose disk, although it completely surrounds the gynæceum, is more developed on one side than on the other. The fruit is also simple, coriaceous, indehiscent. It consists of Indian trees. The *Macphersonia*, shrubs of Madagascar, have flowers regular in all their parts, analogous to those of the preceding genera, very small petals and a dry, stipitate, globular, indehiscent fruit; but they are immediately distinguished by their decomposite-bipinnate leaves.

The *Glennieas* are allied both to the preceding genera and to *Eriocælum*. They have the five valvate sepals of the latter; and the petals are short, more wide than long. But the trilocular ovary becomes a spherical, fleshy fruit, hardly marked by obtuse grooves corresponding to one, two, or three cells. The seeds are exarillate, and the compound leaves have only one or two pairs of folioles. They are trees from Ceylon. The *Schleicheras*, inhabiting tropical

Asia, are, like the *Glennieas*, closely allied, by their foliage and fruit, to *Sapindus* and *Nephelium*; but they have, with the entire and indehiscent fruit of *Glenniea*, the calyx with hardly imbricate short divisions of *Nephelium*, and not the larger sepals, free and distinctly imbricate of *Sapindus* or *Euphoria*. These sepals are again met with in *Melicocca* (fig. 363, 364), trees from tropical America, whose indehiscent fruit is nearly that of *Talisia* and *Lecaniodiscus*, of which the regular flowers have the petals, but without the bearded interior plate of *Talisia*, and the nearly equal stamens with extrorse anthers.

*Melicocca bijuga.*

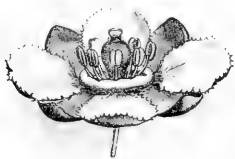


Fig. 363. Flower (♂).



Fig. 364. Longitudinal section of flower.

Beside the preceding genera, but rather doubtfully, we place three exceptional types having the pinnate leaves and solitary ovules of *Melicocca* and *Schleichera*, with the micropyle directed downwards and outwards; the *Huerteas*, trees from Peru and Antilles, whose flowers have five petals, but whose two ovary cells are incomplete, the disk having the five glands interposed to the stamens, not exterior; the

*Alectryon excelsum.*



Fig. 365. Longitudinal section of fruit (♀).

*Alectryons* (fig. 365), trees from New Zealand, whose flowers are apetalous, with a gynæceum and fruit reduced to a single carpel, and whose stamens are neither exterior nor interior to the disk, but encircled at their base by the nearly annular lobes; *Eriandrostachys*, a shrub from Madagascar, having long male

spikes loaded with glomerules, in which the sepals, five or six in number, are arranged with great regularity around the disk and the eight stamens interior to it, but forming an irregular envelope because they are very unequal, the outer ones being short, thick,

and green, like the sepals, while the inner are large, membranous, and coloured like the petals. Its flowers are diœcious and apetalous.

The *Thouinias* constitute a small group of genera with regular flowers, provided with petals, and a circular disk exterior to the stamens, like those of *Melicocca*, but whose uniovulate ovary cells become so many samaras with superior dorsal wing, like those of the Maple, separating at maturity. Such are: the *Thouinias*, plants from tropical America, whose calyx is short, valvate, or hardly imbricate; the *Atalayas*, shrubs from Oceania, whose sepals are large and imbricate; and *Pteroxylon* (fig. 366-369), a tree from southern

*Pteroxylon utile.*



Fig. 366. Flower.

Fig. 368. Seed. Fig. 369. Longitudinal section of seed.

Fig. 370. Longitudinal section of flower.

Africa, whose flowers are tetramerous, with a disk interior to the stamens, instead of being exterior to them, like those of the preceding genera, and whose fruit is formed of two samaras, each dehiscing in two valves and containing a seed prolonged upwards in a long membranous wing placed between the two plates of those of the fruit. In all these genera, the ovule, solitary in each cell, is ascendent, with exterior micropyle.

The *Dodonæas* have given their name to a small group, not very natural, and which we do not think should be distinguished with the title of tribe or series, but which is easily recognised in practice, by its ovary cells each containing two ovules, usually (though not constantly) obliquely descendent, when the micropyle is exterior and superior. They are both primitively so in the *Melicopsidium*, a shrub lately discovered in New Caledonia, having the aspect and trifoliate leaves of certain *Rutaceæ*, and regular flowers with five imbricate sepals, five large imbricate petals, with

glandular edges, five alternipetalous stamens, interior to a circular disk, and a trilocular ovary, succeeded by a capsular tricocous fruit with exarillate seeds. The *Harpullias*, trees from Oceania, with pinnate leaves, have also regular flowers, with large imbricate petals, sometimes pentamerous, more often tetramerous, with 5-8 stamens but without a very visible disk. The capsule is woody and tricocous, more often dicocous, coriaceous and vesiculate, coloured red, and the seeds are provided with an aril. *Hyppelate*, inhabiting the Antilles, has the same tetramerous or pentamerous floral structure as *Harpullia*, with short petals, two descendent ovules in each of the two or three cells of the ovary, and an indehiscent fruit, fleshy or coriaceous, having exarillate seeds and a thick embryo with plano-convex cotyledons. *Hippobromus*, consisting of shrubs from southern Africa and the Mascarene Islands, have the flowers of *Hyppelate*, with very small petals or without corolla, a coriaceous indehiscent fruit, and seeds destitute of aril and albumen, whose embryo has bent or conduplicate cotyledons. *Pseudopteris*, a genus from Madagascar, incompletely known, has male flowers analogous to those of *Hippobromus*, but with five petaloid sepals and five small hood-shaped petals each enveloping one of the glands of the disk, which are independent of each other instead of being united in a ring, and alternate with an equal number of interior long-exserted stamens. The long pinnate leaves of *Pseudopteris* are collected in large numbers at the summit of the branches, and their male flowers are detached from the wood and stems in long clusters of cymes. *Averrhoïdium*, a Brazillian tree, has the compound pinnate leaves of *Averrhoa* and apetalous flowers of *Hyppelate*, *Hippobromus*, and *Schleichera*, bearing towards the middle of the internal angle of each of the three ovary cells, two ovules one of which is ascendent and the other descendent. In *Filicium*, a tree from Ceylon (generally considered as a *Terebinthacea*), the polygamous flowers are also those of *Hyppelate* or *Melicocca*, but the disk is interior to the stamens, and the ovule, although solitary, is directed like that of *Hippobromus*, descendent, with the micropyle upwards and outwards. *Ganophyllum*, a tree from tropical Oceania, placed until now beside *Filicium*, has, in its male flowers, five to eight stamens alternate with the glands of the disk, but more interior, as is the case with the *Sapindaceæ* in general. Its polygamo-dicocious flowers are moreover apetalous, but



the gynæceum is imperfectly known. The *Dodonæas* are, on the contrary, known in all their parts and placed by all in this family, although they have not the disk, with the characters it generally presents. In the male flowers, it is wanting or very little developed; in the female it is interior to the stamens. The perianth is solely formed of a variable number of sepals, from two to six, valvate or imbricate. There are five to eight stamens, and the cells of the ovary, two to six in number, contain each two oblique ovules, both ascendent or descendent, or one of them ascendent and the other descendent. The fruit is a septicidal capsule, with angles projecting or developed in wings. The *Dodonæas*, trees or shrubs from all tropical countries, are especially abundant in Oceania. They have simple or compound pinnate leaves, and small polygamous or diœcious flowers arranged in ramified clusters of cymes. The *Distichostemons*, Australian shrubs, with simple hairy leaves, were formerly confounded with the *Dodonæas*; they differ in their aspect, their sepals five to eight in number, and the indefinite number of their stamens. Their 3-4 lobate ovary becomes a coriaceous capsule with short wings.

The *Alvaradoas*, shrubs from Mexico and the Antilles, form a very distinct small group. The leaves are imparipinnate, and the diœcious flowers, arranged in clusters or spikes, have a pentamerous calyx, five petals, filiform or wanting, and five oppositipetalous stamens. To their bi- or tri-locular ovary succeeds a dry fruit, surmounted by a narrow vertical wing, double or triple, appearing to result from the tardy development of the style. The ovules and seeds are moreover ascendent.

*Akania*, a tree from Australia, is also the type of a small isolated sub-series, because its flowers have a concave receptacle lined inwardly by the disk. It is consequently a perigynous *Sapindaceæ*. Its imbricate sepals and petals, and its stamens, are inserted on the circumference of the receptacular cup, whilst its gynæceum with

*Lagunoa glandulosa.*

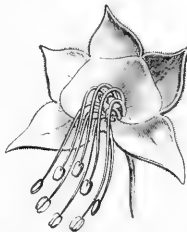


Fig. 370. Flower ( $\frac{2}{3}$ ).

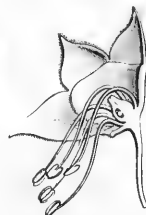


Fig. 371. Longitudinal section of flower.

biovulate cells occupies the bottom. Its leaves are alternate and imparipinnate. The *Llagunoas*, trees from the Columbian, Peruvian, and Chilian Andes, might be connected with it, because their flowers (fig. 370, 371), regular or slightly irregular, have also a concave receptacle, much widened and lined by a glandular disk. But the sepals are valvate, or hardly imbricate; the corolla is wanting and the stamens are inserted at the bottom of the receptacle, like the ovary, whose cells are biovulate. The *Llagunoas* have alternate leaves, 1-3-foliolate, axillary flowers solitary or few in number, and a loculicidal capsule.

*Xanthoceras* (fig. 372-374) is also, amongst the regular types of

*Xanthoceras sorbifolia.*



Fig. 372. Male flower.



Fig. 373. Longitudinal section of male flower.

this family, quite exceptional by its multi-ovulate ovary cells. By this character, as well as by the large development of its five twisted or imbricate petals, destitute of appendages, it brings us back to the *Staphyllaceæ*. Here the

*Xanthoceras sorbifolia.*



Fig. 374. Flower with the perianth removed.

disk is represented by five elongated glands in the shape of horns, interposed to the petals, with which they alternate, and exterior to the eight stamens surrounding the ovary. In each of the three cells of the latter, there are generally two vertical series of four ovules, very nearly transverse, and facing each other by their raphe. They abort more or less completely in the male flower. The fruit is a loculicidal capsule with exalbuminous seeds. The only

*Xanthoceras* known is a shrub of northern China, with imparipinnate leaves and large polygamous early flowers arranged in terminal clusters.

## IV. PANCOVIA SERIES.

There were formerly comprised in the genus *Sapindus* several species with irregular flowers, such as the *S. edulis* (*rubiginosus*), *Rarak*, etc. Notwithstanding numerous and very great affinities with the *Sapindus* proper, they are distinguished by a corolla with only four petals, although the sepals are five in number, and by a disk not arranged in a circle all round the foot of the gynæceum, but only

*Pancovia edulis.*Fig. 375. Flower ( $\frac{1}{4}$ ).

Fig. 376. Diagram.



Fig. 377. Longitudinal section of flower.

developed on its superior side. The first generic name under which they were distinguished, in 1799, was that of *Pancovia*.<sup>1</sup> They have polygamous monœcious flowers (fig. 375-377) with five unequal and imbricate sepals. The four petals are longer, slightly unequal, imbricate, lined inwardly by an appendage, which is sometimes entire and sometimes bilobate at its apex, more or less cuculate or folded and lobate, in the form of a ridge. The stamens are generally eight in number,<sup>2</sup> with more or less excentric insertion, having filaments, glabrous or, more often, covered with hairs, longer in the male flowers, with bilocular introrse anthers sterile in the female

<sup>1</sup> W. *Spec. Plant.* ii. 285.—B. *H. Gen.* 465.—H. *BN. Adansonia*, ix. 229.—*Erioglossum* Bl. *Bijdr.* 229.—ENDL. *Gen.* n. 5611.—B. *H. Gen.* 396, n. 13.—*Moulinsia* CAMBESS. *Mém. Mus.* xxiii. 27, t. 2.—ENDL. *Gen.* n. 5613.—*Uitenia* NORONH. *Vérh. Bat. Gen.* v. (ex Mq. *Fl. Ind.-Bat.* i. p. ii. 574.)—*Dittelasma* HOOK. *f. Gen.* 395, n. 12.—BAKER, *Fl. Maurit.* 57.

<sup>2</sup> Of these eight stamens, five, hardly larger

than the others, are each superposed to one of the sepals; of the three others, one would be superposed to the petal which is wanting, and two, placed on the other side of the flower, are each in face of a petal. The symmetrical plan of the androceum (which is at the same time that of the sexual organs) thus differs from that of the calyx.

flowers. The gynæceum is composed of an ovary with three lobes and three cells, each containing an ascendent ovule, with inferior and exterior micropyle, resembling, in a word, that of *Sapindus*. The style, disengaging itself from the middle of the lobes of the ovary, is simple, having the stigmatiferous extremity entire or slightly trilobate. The fruit is also analogous to that of *Sapindus*, formed of from one to three spherical or elongated drupes, with slight indehiscent endocarp. Each of them contains an exarillate seed, whose fleshy embryo has a short inferior radicle and thick cotyledons, straight or arched. The *Pancovias* are trees from tropical Asia, Oceania, and Africa, with alternate leaves, pari- or impari-pinnate, and having the inflorescence of *Sapindus*, terminal or sometimes borne on the wood of the stem. Three or four species<sup>1</sup> are distinguished.

*Chytranthus*, consisting of shrubs from tropical western Africa, with inflorescence borne on the wood of the branches, is hardly distinct from *Pancovia*. It is only separated by the gamosepalous calyx with

*Diploglottis Cuminghami*.



Fig. 378. Flower (†).



Fig. 379. Longitudinal section of flower.

five divisions nearly valvate or slightly imbricate, and by the shape of the petals, whose claw is hollow in the form of a small flattened horn, from the interior of which issues a subulate tongue. The *Schmidelia*, shrubs from all the tropical regions of the globe, have, with the lobate and indehiscent fruit of the preceding genera, tetramerous flowers and leaves usually uni- or tri-foliate, rarely having four or five folioles. The *Hemigyrosa*, trees from tropical Asia, have

<sup>1</sup> DC. *Prodr.* ii. 507, n. 2 (*Afzelia*); *Syst.* i. 608; *Prodr.* i. 608, n. 19 (*Sapindus*).—BL. *Bijdr.* 229 (*Erioglossum*); *Cat. Hort. Buitenz.* 62 (*Sapindus*); *Rumphia*, iii. 93, t. 167 (*Sapindus*); 118, t. 166 (*Erioglossum*).—ROXB. *Pl. Coromand.* t. 62 (*Sapindus*).—RICH. GUILLEM. et PERR. *Fl. Seneg.*

*Tent.* i. 118, t. 28.—SPAN. in *Linnaea*, xv. 181 (*Erioglossum*).—BENTH. *Fl. Austral.* i. 454 (*Erioglossum*).—BAKER, in *Oliv. Fl. trop. Afr.* i. 420 (*Erioglossum*).—WALP. *Rep.* i. 407 (*Erioglossum*).

the flowers with four or five parts of *Schmidelia* or *Pancovia*; but the indehiscent fleshy fruit, coriaceous or woody, spherical or triangular, has three cells, covered inwardly with hairs and each containing a seed of *Pancovia*. In *Diploglottis*, a beautiful Australian tree

*Diploglottis Cunninghami*.

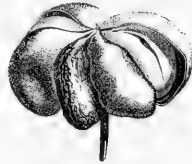


Fig. 380. Flower with the perianth removed. Fig. 381. Dehiscent fruit.

with pinnate leaves, the pentamerous flowers (fig. 378–380) are constructed very nearly like those of *Pancovia*, but the fruit (fig. 381) is a loculicidal capsule whose seeds, solitary in each cell, are totally enveloped by a large fleshy aril, coloured and sapid, like that of *Euphoria*.

The *Paullinia*, have also flowers irregular or tetramerous, like those of *Schmidelia*, or more commonly pentamerous, like those of *Pancovia* and *Diploglottis*, but the fruit is a piriform septicidal capsule, containing one to three seeds (fig. 382, 383), the embryo is thick and fleshy, and the testa, glossy and of dark colour, is furnished, at its base only, with a short cupular-shaped aril. All the species of *Paullinia* are American and nearly eighty in number, but one or two species are met with in tropical Asia and Africa

*Paullinia sorbilis*.



Fig. 382. Seed.

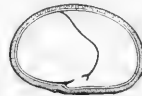


Fig. 383. Longitudinal section of seed.

(where they have perhaps been introduced). They are volubile, climbing plants, with alternate leaves, compound or decomposite, pinnate or digitate, leaves often dentate, flowers arranged in axillary clusters of cymes usually provided with two tendrils below. The *Castanellas*, also bindweeds of tropical America, differ very little from the *Paullinias* with pentamerous flowers (with which perhaps they will soon be united); they have trifoliate leaves and a capsular fruit, at first slightly fleshy, all bristling with rigid prickles. *Valenzuela* is a non-climbing shrub from Chili, with the irregular 4–5-

merous flower of *Paullinia* and *Schmidelia*, simple and opposite leaves, and a capsular, coriaceous, vesicular, lobate, loculicidal fruit, whose exarillate seeds contain a bent embryo with folded cotyledons. *Bridgesia*, a shrub from the same country, has very nearly the same aspect, alternate leaves, entire or trilobate, dentate or notched, the same flowers and the same seeds, but the capsular fruit is trilobate, almost membranous, and each of the cells, surmounted by a vertical dorsal ridge, is separated at maturity from the central columella.

In *Urvillea* and *Serjania*, consisting of climbing shrubs from tropical America, are again found the sarmentose, volubile stems of *Paulinea*, with the alternate leaves and inflorescence usually provided with two tendrils at the base, the irregular flowers with five sepals (two of which may be united to a variable height), four petals and the seeds with a but slightly developed aril; but the fruit is formed of three samaras separated from the central columella, like the lobes

*Cardiospermum Halicacabum.*



Fig. 384. Fruit.

of that of *Bridgesia*. In the *Urvilleas*, plants with trifoliate leaves, the seminiferous cavity occupies the middle of the height of the samaras, whilst in *Serjania* whose leaves are also frequently pinnate the seed is at the top of the samara, the whole of whose inferior portion is prolonged in a wing resembling that of the Maple turned upside down. The *Tubulicias*, trees, not climbing, from central tropical America, with alternate and imparipinnate

leaves, have the irregular flower of *Serjania* and *Urvillea*, with a fruit divided into three samaroid capsules, each opening in halves after being detached from the columella; the seminiferous cavity occupies the upper part. It is inferior, on the contrary, in *Pseudatalaya*, an Australian genus which, having the irregular flower, with four petals, of *Puncovia*, and the fruit of *Atalaya* and *Thouinia* (that is to say, the fruit of a Maple), of which it represents here the irregular form. The *Cardiospermums*, frutescent or suffrutescent plants from all tropical regions, one species of which is frequently cultivated by us as an annual, have decomposite leaves, and an inflorescence with two tendrils like most of the *Serjanias* and *Urvilleas*, as well as the irregular flower, but the fruit (fig. 384) is a membranous or loculicidal capsule with three inflated and vesiculate cells.

Whilst the ovary cells are uniovulate in the preceding genera, they each contain two or more ovules in the following types of which the best known by us is *Kalreuteria* (fig. 385-390). In this beautiful tree from North China, propagated by our florists, irregular

*Kalreuteria paniculata*.



Fig. 387. Fruit.



Fig. 386. Longitudinal section of flower (?).



Fig. 388. Longitudinal section of fruit.



Fig. 390. Longitudinal section of seed.

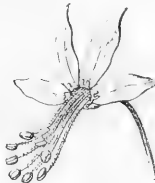


Fig. 385. Flower.



Fig. 389. Seed (?).

flowers are also observed, having five sepals, with three or four unguiculate petals, five to eight declinate stamens, and a unilateral disk; but in each ovary cell is inserted, towards the middle of the internal angle, two ovules primitively ascendent, with the raphe internal, whilst when full grown, only one remains so, the other becoming descendent, with the raphe outwards. The fruit (fig. 387-388) is a vesicular capsule, recalling that of *Cardiospermum*, whose three cells, dehiscent by longitudinal dorsal clefts, are blended above and sometimes below. The exarillate seeds (fig. 389, 390) contain a fleshy embryo, with large cotyledons rolled in a spiral form. *Stocksia*, a small shrub from the mountains of Beloochistan, is very different in aspect, although it has the flowers organised very nearly the same,

with two collateral ovules in each cell. The branches are in part transformed into spines, and the leaves are simple, linear, alternate, or fasciculate. *Diploteltis* has also a very different aspect. It consists of Australian herbs, suffrutescent at the base, whose flowers are also very nearly those of *Kæhreuteria*; but the glandular ovary is didymous or trilobate, and the fruit is a coriaceous, depressed capsule, bi- or tri-lobate, septicial, divided at maturity into berries dehiscent by their internal angle. The *Erithropysas* are also closely allied to the preceding genera. They also have irregular flowers,

*Erithropysa undulata*.



Fig. 391. Hermaphrodite flower (♀).



Fig. 392. Longitudinal section of flower.

with four petals and a more or less excentric ovary with bi-ovulate cells. The petals are provided with a long claw lined in the upper part by a petaloid appendage, more or less lobate and cut in fimbriate tufts (fig. 391, 392). The receptacle has the shape of a cup on whose edges the very pronounced waved disk is projected from one side, so that the stipitate gynæceum is more or less excentric. The fruit is vesiculate, almost like that of *Kæhreuteria*, and the cells of the ovary are also biovulate. The two species of *Erithropysa* known are, one from the Cape, the other from Madagascar, and they have large flowers appearing before the imparipinnate leaves. *Cossignia* (fig. 393–398), consisting of shrubs from Zanzibar, Madagascar, and the Mascarinic islands, has nearly all the characters of *Erithropysa*;



but the four petals are destitute of appendage; the widened receptacle is furnished with a large, flattened, unilateral disk; the fruit is capsular, loculicidal, then in part septicidal; the three cells are separated

*Cossignia borbonica.*



Fig. 393. Male flower (♂).



Fig. 394. Longitudinal section of male flower.



Fig. 395. Male flower with the perianth removed.

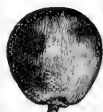


Fig. 397. Seed (♂).



Fig. 398. Longitudinal section of seed.



Fig. 396. Fruit.

finally from the columella. Sometimes the coat is nearly woody; sometimes, as in the Malagash species, it is vesiculate and coloured. In this case *Cossignia* completely represents the irregular form of *Harpullia*; the exarillate and exalbuminous seeds have an embryo rolled up like that of *Kædreuteria* (fig. 398). The leaves are imparipinnate or trifoliate. *Loxodiscus*, a shrub from New Caledonia, is closely allied to the preceding genera. Its five sepals and four or five petals, bordered by small globular glands, are imbricate. The excentric ovary, accompanied by a large cupula-shaped unilateral

disk, has three biovulate cells, and the fruit is (before maturity) membranous and glandular. The seeds bear a small aril. The leaves of *Loxodiscus* are imparipinnate. *Ugnadia*, consisting of small Texan trees, is also closely allied to *Erithrophyssa*,

*Magonia pubescens.*

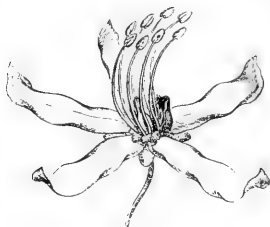


Fig. 399. Male flower.



Fig. 400. Longitudinal section of flower.

having its perianth, the petals lined at the top of the claw with an appendage lobate and cut in tufts, to the number of four or five; and the three ovary cells each containing two ascendent

ovules. But the fruit is a thick coriaceous capsule, depressed at the apex and apiculate, loculicidal. The exalbuminous seeds contain a fleshy embryo resembling that of *Æsculus*. Like *Erithrophyssa*, *Ugnadia* has early polygamous flowers, developed before the imparipinnate leaves.

*Magonia pubescens.*



Fig. 401. Hermaphrodite flower (½).

The *Magonias* (fig: 399–403) constitute a small distinct and anomalous group in this series, by their multiovulate ovary cells and winged seeds. They have very nearly the flowers of *Erithro-*

*physa* and *Cossignia*, with five unequal petals destitute of appendages, a large unilateral disk, lined and cut in a lobate ridge. The three ovary cells each contain in the internal angle two vertical series of ovules, and the voluminous, loculicidal fruit, opens in three large

concave valves which abandon the columella and leave at liberty the large, flattened, imbricate seeds, each containing a straight

*Magonia pubescens.*

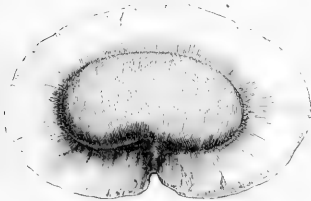


Fig. 402. Seed (¾).

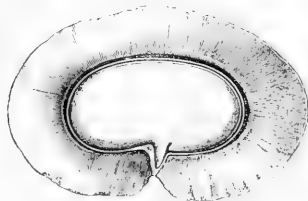


Fig. 403. Longitudinal section of seed.

embryo with large elliptical cotyledons (fig. 402, 403). The *Magonias* are beautiful Brazilian trees with alternate compound-pinnate leaves and polygamous flowers.

### V? ÆSCULUS SERIES.

*Æsculus*,<sup>1</sup> or horse chesnut (fig. 404-408), has hermaphrodite or polygamous and irregular flowers. The calyx is campanulate or tubular, quinquefidal, with five nearly equal or unequal lobes, imbricate in the præfloration. The petals, five, or, more often, only four in number, are unequal,<sup>2</sup> destitute of appendage, and each supported by a narrow claw, flattened or with involute edges. They are also imbricate in the bud. The stamens are rarely five in number and alternipetalous. More often there is also a verticel formed of oppositi-petalous pieces, one, two, or three in number.<sup>3</sup> The filaments are free, inserted inside a circular or incomplete disk,

<sup>1</sup> L. *Gen.* n. 462.—J. *Gen.* 251.—LAMK. *Ill.* t. 273.—DESR. *Dict.* iii. 712; Suppl. iii. 593.—DC. *Prodr.* i. 597.—SPACH. in *Ann. Sc. Nat.* sér. 2, ii. 52; *Suit. à Buffon*, iii. 18.—ENDL. *Gen.* n. 5641.—SCHNIZL. *Iconogr.* t. 230.—A. GRAY, *Gen. Ill.* t. 176, 177.—PAYER, *Organog.* 128, t. 28.—B. H. *Gen.* 398, n. 21 (part).—H. Bx, *Payer, Fam. Nat.* 318.—LEM. et DCNE. *Tr. Gén.* 325.—*Hippocastanum* T. *Inst.* 611,

t. 382.—GÆRTN. *Fruet.* ii. 135, t. 111 (incl.: *Calothyrsus* SPACH, *Macrothyrsus* SPACH, *Pavia* BOERH.).

<sup>2</sup> And usually of different colour, the two upper being often stained inwardly and at the base with yellow or red.

<sup>3</sup> On the situation of these oppositipetalous stamens, see PAYER, *loc. cit.* 130.

entire or lobate. The three lower are usually declinate. The anthers are bilocular, introrse, dehiscent by two longitudinal clefts.<sup>1</sup> The gynæceum is composed of a trilocular ovary surmounted by a simple style, with undilated stigmatiferous apex. In the internal angle of each cell is a placenta supporting two ovules, horizontal, or more often directed inversely. One of these, attached below, is

*Æsculus Hippocastanum.*



Fig. 405. Flower.



Fig. 404. Portion of inflorescence.



Fig. 406. Longitudinal section of flower.



Fig. 407. Seed.

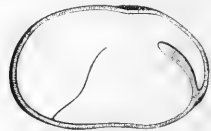


Fig. 408. Longitudinal section of seed.

ascendent with the micropyle inferior and exterior; the other is descendent, with micropyle turned upwards and inwards.<sup>2</sup> The fruit is a thick coriaceous loculicidal capsule, spherical or nearly so, the surface smooth or bristling with points. The cells, one to three in number, contain one or two seeds whose exalbuminous embryo has two large hemispherical fleshy cotyledons, often conferruminate, and an arched conical radicle, involved in a sort of sheath forming the

<sup>1</sup> In the species observed (H. MOHL, *Ann. Sc. Nat.* sér. 2, iii. 337): the pollen is "ellipsoïde; trois plis; dans l'eau, sphère à trois

bandes avec trois papilles (*Æsculus macrostachya*, *Æ. flava*, *Æ. Hippocastanum*)."

<sup>2</sup> The ovular coat is double.

thick coriaceous and glabrous testa. The majority of the species of *Æsculus* have a tube-shaped calyx, petals very unlike each other, two especially, with slender and long claw, being spatulate or cochleate, and a fruit usually smooth; the genus *Pavia*<sup>1</sup> has been made of them, which we only preserve here as a section, the same as *Macrothyrsus*<sup>2</sup> and *Calothyrsus*,<sup>3</sup> genera proposed for the species of *Æsculus* with tubular calyx, bilabiate or nearly so in the latter, which has the claws of the petals flattened, while they are canaliculate in the former, remarkable, moreover, by the arched staminal filaments. So constituted, the genus *Æsculus* contains twelve to fifteen species,<sup>4</sup> beautiful trees or shrubs from North America and temperate Asia, having opposite, compound-digitate leaves, with 5-9 denticulate folioles, and flowers (white, pink, or yellow) arranged in ramified terminal clusters, composed of cymes, usually uniparous.

The species of *Billia*,<sup>5</sup> shrubs from Mexico and Columbia, have been sometimes joined to *Æsculus*, having opposite digitate leaves generally with three folioles, but distinguished from it, it is said, by the petals being provided with a bilobate appendage. This is the case in one of the species of the genus inhabiting Columbia; but the character is of little value, for it disappears in the other species, otherwise very analogous, native of Mexico, and only exhibiting a slight interior thickening of the claw of the petals. Nevertheless, *Billia* might, strictly, be preserved as a distinct genus, because the disk is excentric and unilateral, and the unequal distinctly imbricate sepals are almost completely free.

## VI. MELIANTHUS SERIES.

The honey-flowers<sup>6</sup> (fig. 409-413) have hermaphrodite and irregular flowers. The very unequal receptacle is prolonged backwards

<sup>1</sup> BOERH. *Hort. Lugd.-Bat.* 260.—POIR. *Dict.* v. 93.—TURP. *Dict. Sc. Nat.* Atl. t. 165, 166.—SPACH, *Ann. Sc. Nat.* sér. 2, ii. 52; *Suit. à Buffon*, iii. 18.

<sup>2</sup> SPACH, *Ann. Sc. Nat.* sér. 2, ii. 61.

<sup>3</sup> SPACH, *loc. cit.* 62.

<sup>4</sup> REICHB.  *Ic. Fl. Germ.* v. t. 161.—JACQUEM. *Voy. Bot.* t. 35.—A. GRAY, *Man.* ed. 5, 117.—BOISS. *Fl. Or.* i. 946.—GREN. et GODR. *Fl. de*

*Fr.* i. 323.—*Bot. Mag.* t. 2118, 5017, 5117.—WALP. *Rep.* i. 423; *Ann.* ii. 226; iv. 381; vii. 624.

<sup>5</sup> PEYR. *Bot. Zeit.* (1858), 153.—TR. et PL. *Ann. Sc. Nat.* sér. 4, xviii. 366.—WALP. *Ann.* vii. 624.—PUTZEYSIA PL. et LIND. *Cat.* (1857).

<sup>6</sup> *Melanthus* T. *Inst.* 430, t. 245.—L. *Gen.* n. 795.—ADANS. *Fam. des. Pl.* ii. 388.—J. *Gen.* 795.—LAMK. *Ill.* t. 552.—DESROUSS. *Diet.* iv.

in a sort of spoon-shaped bowl on which is inserted one of the pieces of the calyx, the smallest of all,<sup>1</sup> whilst the four other sepals, anterior and lateral, are more developed. All are quincuncially imbricate in the bud. With them alternate four or five petals (the anterior may be wanting;<sup>2</sup>) like narrow fleshy tongues, more or less

*Melianthus major*.

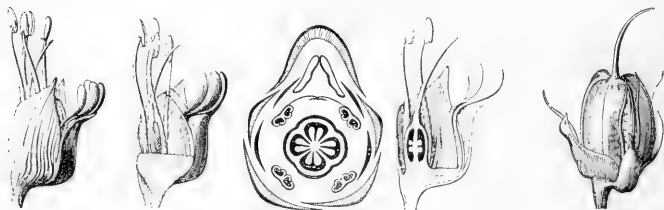


Fig. 409. Flower.

Fig. 410. Flower, a sepal folded back.

Fig. 411. Diagram.

Fig. 412. Longitudinal section of flower.

Fig. 413. Young fruit.

tomentose. The receptacle is adorned inwardly by a glandular disk rising in a projecting double ridge on the side of sepal 2, and secreting an abundant sweet nectar. The stamens are four, superposed to the sepals 1, 3, 4, and 5; they are unequal, the two anterior being finally the shortest, and the two posterior may be completely united below by a transverse fillet; each is formed of a free declinate filament and a bilocular introrse anther dehiscent by two longitudinal clefts. The free, slightly excentric, gynæceum is formed by an ovary with four cells separated outwardly by vertical grooves. Two of them are lateral, the other two anterior and posterior. Each of them exhibits in its internal angle a placenta supporting two vertical series of ascendent, anatropal ovules, having the micropyle directed downwards and outwards.<sup>3</sup> There are one or two on each series. The fruit, accompanying for a longer or shorter time the perianth and staminal filaments (fig. 413), is a papyraceous capsule, with four projecting lobes and four cells opening longitudinally and inwardly above. They generally contain an exarillate seed, having

57; Suppl. iii. 646.—GERTN. *Fruct.* iii. 158, t. 211.—DC. *Prodr.* i. 708.—A. JUSS. *Mém. Mus.* xii. 459, t. 28, fig. 48.—LINDL. *Veg. Kingd.* 479.—ENDL. *Gen.* n. 6043.—PAYER, *Organog.* 86, t. 18.—B. H. *Gen.* 411, n. 69.—SCHNIZL. *Iconogr.* t. 253 a.—LEM. et DCNE. *Tr. Gén.* 228.—Diple-

*risma* PL. *Trans. Linn. Soc.* xx. 416, t. 20, fig. 15–20.

<sup>1</sup> It is sepal 2.

<sup>2</sup> It exists at the commencement, but may be arrested at a very early period of its evolution.

<sup>3</sup> With double coat.

the external coat crustaceous and smooth, and a thick fleshy albumen surrounding a small green embryo, with oval linear cotyledons, and radicle truncate or swollen at the apex. The Honeyflowers are glabrous shrubs, glaucous, often odorous, with herbaceous branches, covered with alternate imparipinnate leaves, whose petiole is accompanied at its base by two foliaceous stipules, free and lateral or connate in a large membranous intra-axillary plate. The folioles are opposite, dentate, unsymmetrical at the base. The flowers are collected in axillary and terminal clusters, each situated in the axil of a bract. Four species<sup>1</sup> are known, natives of the Cape of Good Hope, one or two having been introduced into the majority of tropical countries.

Beside the Honeyflowers are placed: *Bersama*, consisting of trees and shrubs with pinnate leaves, from tropical and southern Africa, having very nearly the same flower, but a less irregular receptacle, larger and imbricate petals, four free or diadelphous stamens and four or five ovary cells, each containing a single ascendent ovule, nearly basilar, with the micropyle inferior and exterior; and *Greyia*, a shrub from South Africa, with simple leaves, nearly entire or sublobate, exstipulate, having almost the perianth of *Bersama*, ten stamens interior to a cupola-shaped disk, and an ovary with five cells, often incomplete or multiovulate. The fruit is septicidal, and separates at maturity into five polyspermous follicles.

## VII? AITONIA SERIES.

In the genus *Aitonia*,<sup>2</sup> assigned frequently to other families, the tetramerous flowers (fig. 414, 415) are hermaphrodite and regular. The sepals, united below, are imbricate and fall early. The alternate petals, much longer, are twisted or, more rarely, imbricate. The stamens are hypogynous, arranged on two verticels of four each. The monadelphous filaments are united in a tube below, then free, exserted, each surmounted by a bilocular introrse anther, dehiscent by two longitudinal clefts. The gynæceum is free, formed of an ovary

<sup>1</sup> VAHL, *Symb. Bot.* iii. 85.—PAPPE, *Fl. Cap. Med. Prodr.* 6.—PL. loc. cit. 414, t. 20.—HARV. et SOND. *Fl. Cap.* i. 367.—Bot. Reg. t. 45.—Bot. Mag. t. 301.—WALP. *Reg.* i. 498; *Ann.* vii. 638.

<sup>2</sup> L. FIL. *Suppl.* 303 (nec Forst.).—A. JUSS. in *Mém. Mus.* xix. 186.—DON, *Edinb. New Phil. Journ.* xiii. 242.—ENDL. *Gen.* n. 5548 (*Meliaceis* aff.).—B. H. *Gen.* 411. n. 68.

with four alternipetalous cells, surmounted by a unique slender exerted style, the stigmatiferous apex undivided and not dilated. In the internal angle of each cell two descendent collateral ovules are seen, incompletely anatropous, with superior and exterior micropyle. The fruit (fig. 416, 417) is a vesicular, membranous, veined, loculici-

*Aitonia capensis.*



Fig. 414. Hermaphrodite flower. (?).



Fig. 415. Longitudinal section of flower.

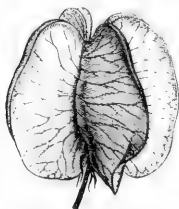


Fig. 416. Fruit.

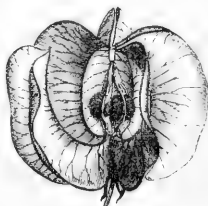


Fig. 417. Dehiscing fruit.

dal capsule, with four wing-shaped lobes corresponding to as many cells, each containing one or two seeds in the internal angle with albumen wanting or very thin. The embryo<sup>1</sup> has oblong cotyledons and a short superior and straight radicle. The only *Aitonia* known<sup>2</sup> is a shrub with rigid branches, native of South Africa. The leaves are alternate or fasciculate, slightly developed, simple, entire, linear-oblong, nearly coriaceous, the petiole wanting or very short, exstipulate. The flowers (reddish) are axillary, pedunculate, solitary or few in number.

<sup>1</sup> Usually of a greenish colour.

*Exot. t.* 229.—HARV. et SOND. *Fl. Cap.* i. 243.

<sup>2</sup> *A. capensis* L. *FL.* loc. cit.—REICH. *Icon.*

—*Bot. Mag.* t. 173.



## VIII. MAPLE SERIES.

The Maples <sup>1</sup> (fig. 418-426), with many authors constituting a distinct family, have regular and polygamous flowers. The calyx has generally five sepals arranged in quincuncial præfloration in the bud,

*Acer pensylvanicum.*



Fig. 418. Floriferous branch.



Fig. 419. Flower (♂).



Fig. 420. Longitudinal section of flower.

and the alternate petals are also imbricate, destitute of appendage. The stamens, sterile in the female flower, are rarely five in number, superposed to the petals, or ten, arranged on two verticils. Generally eight are observed, six superposed in pairs to

<sup>1</sup> *Acer*. T. *Inst.* 615, t. 386.—L. *Gen.* n. 1155.—ADANS. *Fam. des Pl.* ii. 383.—J. *Gen.* 251.—GERTN. *Fruct.* ii. 166, t. 116.—LAME. *Dict.* ii. 378; *Suppl.* ii. 572; *Ill.* t. 844.—MCENCH, *Meth.* 384.—DC. *Prodr.* i. 593.—TURP. *Dict. Sc. Nat.* Atl. t. 163.—SPACH, *Ann. Sc. Nat. sér.*

2, ii. 160; *Suit. à Buffon*, iii. 84.—ENDL. *Gen.* n. 5558.—PAYER, *Organog.* 124, t. 27.—A. GRAY, *Gen. Ill.* t. 174.—B. H. *Gen.* 409, n. 60.—H. BN. in *Payer, Fam. Nat.* 313.—LEM. et DCNE. *Tr. Gén.* 324.

three of the sepals.<sup>1</sup> The filaments are free, inserted at the base in a large hypogynous disk relatively to which they are more or less interior or exterior, and the anthers are bilocular, introrse, dehiscent by two longitudinal clefts.<sup>2</sup> The gynæceum, rudimentary in the male flower, is formed by a free bilocular ovary compressed perpendicularly to the dividing partition of the two cells, surmounted by a

*Acer coccineum.*



Fig. 421. Male inflorescence.



Fig. 423. Female inflorescence. Fig. 424. Female flower. Fig. 422. Male flower.

style immediately divided into two long branches stigmatiferous within and above. In the internal angle of each cell are inserted two ascendent ovules, incompletely anatropal, whose micropyle<sup>3</sup> is finally directed downwards and outwards, and the hilum soon produces a large axillary expansion more or less surrounding the seed. The fruit is a double samara with two cells,<sup>4</sup> whose wings are formed by the development of the backs of the carpels; these cells separate finally from each other and contain one or two seeds, having under their coats a conduplicate embryo, with thin and narrow cotyledons, irregularly plaited or convolute, and an elongated inferior radicle. In certain Maples the flowers are apetalous; in others 4-12-merous. In others again, like *Acer Negundo* (fig. 426), of which

<sup>1</sup> PAYER, *loc. cit.* 125. According to this author the two stamens superposed to the same sepal are not both of the same age.

<sup>2</sup> According to H. MOHL. (*Ann. Sc. Nat.* sér. 2, iii. 337), the pollen is "ovoïde, trois plis; dans

l'eau, sphérique avec trois larges bandes (*A. platanoides campestre, dasycarpum, monspessulanum, Pseudoplatanus*)."

<sup>3</sup> With double coat.

<sup>4</sup> Sometimes with three or more cells.

a separate genus has been made,<sup>1</sup> the apetalous, dioecious flowers have a small calyx and linear anthers, exserted. This genus contains about fifty species,<sup>2</sup> growing in Europe and North America and also abounding in temperate Asia, the Himalayas, and Japan. Some are also found in Java. The leaves are opposite, exstipulate, simple, entire, palmatilobate or palmati-partite, pinnate in *Negundo*. The flowers, which are precocious, axillary or terminal (green, yellow, reddish), are arranged in spiciform or corymbiform clusters of cymes.

In connection with the Maples, *Dobinea* has been placed in this series. It is a shrub from the mountains of India, having opposite simple leaves and tetramerous male flowers, diplostemonous and with double perianth, whilst the female flower has an unilocular ovary, with a descendent ovule, superior and interior micropyle, and no perianth; but the dry, compressed, margined fruit, containing a seed whose embryo has flat oval cotyledons and an accumbent radicle, is adnate to a bract growing in a suborbicular, membranous, veined wing resembling a samara.

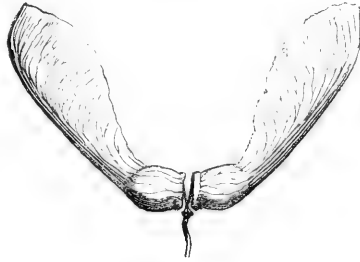
*Acer Pseudoplatanus.*

Fig. 425. Fruit.

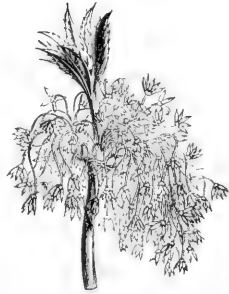
*Acer Negundo.*

Fig. 426. Floriferous male branch.

<sup>1</sup> *Negundo* MOENCH, *Meth.* 334.—DC. *Prodr.* i. 596.—SPACH, *Suit. à Buffon*, iii. 118.—ENDL. *Gen.* n. 5559.—A. GRAY, *Gen.* III. t. 175.—B. H. *Gen.* 409, n. 61—*Negundidium* RAPIN. (ex DC.).

<sup>2</sup> REICHB. *Le. Fl. Germ.* v. t. 162-164.—HOOK. et ARN. *Beech. Voy. Bot.* t. 77 (*Negundo*).—L'ÉR. *Stürp.* t. 98.—MICHX. *Arbr. For.* ii. t. 14-17.—TORR. et GR. *Fl. N.-Amer.* i. 249 (*Negundo*).—DESF. *Ann. Mus.* vii. t. 25.—WALL. *Pl. As. Rar.* t. 104, 105, 132.—SINTH. *Fl.*

*Grac.* t. 361.—HOOK. *Fl. Bor.-Amer.* t. 38, 39; *Lond. Journ.* vi. t. 6.—CAMBESS. in *Jacquem. Voy. Bot.* t. 34.—BL. *Rumphia*, iii. 192, t. 67, B.—BENTH. *Fl. Hongk.* 47.—A. GRAY, *Man.* ed. 5, 118, 119 (*Negundo*).—BOISS. *Fl. Or.* i. 947.—MIQ. *Profl. Fl. Jap.* 18, in *Arch. Néerl.* ii. (1867).—GREN. et GODR. *Fl. de Fr.* i. 321.—WALP. *Rep.* i. 408, 410 (*Negundo*); *Ann.* i. 132; ii. 207; iv. 373; vii. 632, 634 (*Negundo*).

This family is also formed "by connection," and such very nearly, in the preceding account, as it was conceived by BLUME,<sup>1</sup> in 1847. He united together, in fact: 1st. *Sapindaceæ* properly speaking, divided into seven tribes,<sup>2</sup> with flowers, some regular and others irregular; 2nd. *Dodoneaceæ*; 3rd. *Acerineæ*; 4th. *Hippocastaneæ*; 5th. *Meliosmæ* (*Sabiæ*). In this group then are confounded the two families which had, in 1789, been distinguished by A. L. DE JUSSIEU<sup>3</sup> under the names of *Sapindi* and *Acera*, but to which unfortunately he allied some *Malpighiaceæ* as *Tryallis*, some *Celastraceæ* as *Hippocrateæ*, and some *Ternstroemiaceæ* as *Pekæ*; whilst *Dodonæa* was classed among *Terebinthaceæ*, and *Staphylea* among the *Rhamnii*. In 1821, KUNTH<sup>4</sup> divided the *Sapindaceæ* of equinoctial America into three sections: *Paulliniaceæ*, *Sapindaceæ* proper and *Dodoneaceæ*, distinguishing them from one another by the presence or absence of a scale interior to the petals. DE CANDOLLE<sup>5</sup> preserved in 1824 this mode of grouping which has absolutely no value, even for separating the genera. CAMBESSÈDES,<sup>6</sup> who resumed in 1829 the monographic study of the *Sapindaceæ*, only divided them into *Sapindeæ* and *Dodoneæ*, in which he was closely followed by ENDLICHER<sup>7</sup> in 1838, and by LINDLEY,<sup>8</sup> whose *Sapindaceæ* comprise all the groups admitted by BLUME, except *Acerææ*. The *Staphyleæ*, long included amongst *Celastraceæ*, were finally separated by BARTLING<sup>9</sup> and LINDLEY,<sup>10</sup> but as a distinct order, and remained such until the epoch when BENTHAM and HOOKER<sup>11</sup> made them only a tribe of *Sapindaceæ*. With them, this family contains five sub-orders: *Sapindeæ*, *Acerineæ*, *Dodoneæ*, *Meliantheæ*, and *Staphyleæ*. The *Meliantheæ* had, before them,<sup>12</sup> been approached, in preference, to the *Rutaceæ* and *Zygophylleæ*. In this family, such as they understand it, are united seventy-four genera,<sup>13</sup> and they exclude, as a distinct family,<sup>14</sup> the *Sabiaceæ*, formerly classed in England<sup>15</sup> between *Menispermaceæ* and *Lardizabaleæ* and previously placed by

<sup>1</sup> *Rumphia*, iii. 91.

<sup>2</sup> 1. *Sapindeæ*; 2. *Allophylleæ*; 3. *Meliococcææ*; 4. *Cupaniææ*; 5. *Cossignieæ*; 6. *Pauliniææ*; 7. *Thouiniææ*.

<sup>3</sup> *Gen.* 246, 250, *Ord.* 5, 6.

<sup>4</sup> *H. B. K. Gen. Nov. et Spec.* v. 99.

<sup>5</sup> *Prodr.* i. 601.

<sup>6</sup> *Mém. Mus.* xviii. (1829), i.

<sup>7</sup> *Gen.* 1066, *Ord.* 230.

<sup>8</sup> *Veg. Kingd.* (1846) 381, *Ord.* 135.

<sup>9</sup> *Ord. Nat.* 381.

<sup>10</sup> *Synops.* (1829) 75; *Veg. Kingd.* 381, *Ord.* 135.

<sup>11</sup> *Gen.* (1862) 392, 409, *Subord.* 5.

<sup>12</sup> A. Juss. in *Mém. Mus.* xii. 459.—ENDL. *Gen.* n. 6043.—LINDL. *Veg. Kingd.* 478.

<sup>13</sup> Reduced for us to sixty-two.

<sup>14</sup> *Gen.* 413, *Ord.* 52.

<sup>15</sup> HOOK. F. & THOMS. *Fl. Ind.* i. 206.

ENDLICHER,<sup>1</sup> under the name of *Meliosmea*, between *Sapindaceæ* and *Hippocastaneæ*. We replace them as a series in the family of *Sapindaceæ*, adding seven new genera<sup>2</sup> and replacing *Huerteæ* of RUIZ and PAVON, *Ganophyllum* of BLUME, and *Filicium* of THWAITES; which, without the imperfectly known types whose place is quite uncertain,<sup>3</sup> raises the number of genera to seventy-four. We group them in eight series whose general characters are as follows:

1. STAPHYLEÆ.—Hermaphrodite flowers, regular, with depressed or slightly concave receptacle, lined by a disk whose thickened edge is interior to stamens which are equal in number to the petals. Carpels totally independent or united to a variable height. Ovules 2–∞. Fruit dry or fleshy. Seeds with or without aril, with albumen and rectilinear embryo. Leaves opposite, simple or compound.—2 genera.

2. SABIEÆ.—Hermaphrodite or uni-sexual regular flowers. Disk interior to stamens superposed to the petals and equal or less in number. Carpels independent or united in an ovary with 2 or 3 cells. Ovules 2 in each cell, more or less distinctly ascendent and anatropous, micropyle directed downwards and outwards. Fruit dry or fleshy, generally indehiscent. Seeds with albumen wanting or very slight, a bent embryo, conduplicate or rolled in a spiral. Leaves alternate (rarely opposite), simple or compound pinnate.—2 genera.

3. SAPINDEÆ.—Flowers regular or nearly so, polygamo-diœcious. Petals equal, the same in number as the divisions of the calyx and alternate with them, often lined by a scale. Disk exterior to the androecium, more rarely interior or interposed to the stamens, complete, circular, regular or nearly so. Gynœceum central with 1–2-

<sup>1</sup> Gen. 1165.

<sup>2</sup> *Podonophelium*, *Crossonephelis*, [*Eriandrostachys*, *Melicopsidium*, *Pseudopteris*, *Averrhoïdium*, *Pseudatalysa*.

<sup>3</sup> 1st. *Eystathes* (LOUR. *Fl. Cochinch.* 234); —DC. *Prodr.* i. 618 (*Eustathes*); —ENDL. *Gen.* n. 5633).—Tree with entire alternate leaves, flowers, 5-merous, 8-androus, fruit fleshy, 1-locular, 4-spermous.

2nd. *Hedycarpus* (JACK, *Trans. Linn. Soc.* xiv. 115; —ENDL. *Gen.* n. 5877; Suppl. iii. 79, nec HASSK. nec MIQ.).—*Euphorbiacea*, ex B. H. *Gen.* 392. "Recte ad *Sapindaceas* translatus fuit," M. ARG. *DC. Prodr.* xv. sect. ii. 1259 (*Schmidelia* ?)

3rd. *Oldfieldia* (B. H. Hook. *Journ.* (1850),

ii. 184, t. 6; —H. BN. *Euphorbiac.* 657). African tree (cultivated in hothouses), with compound-digitate, opposite leaves, fruit capsular, loculicidal, and cells dispermous. Doubtful *Euphorbiaceæ*, according to HOOKER. *Sapindaceæ* (M. ARG. *loc. cit.*).

4th. *Racaria* (AUBL. *Guian.* ii. Suppl. 24, t. 382). Shrub with compound pinnate leaves, drupaceous fruit containing two or three monospermous kernels (very imperfectly described and doubtfully referred to the *Sapindaceæ*).

5th. *Schickea* (KARST. *Bot. Zeit.* (1848), 398). "Gen. ut videntur *Serjaniæ* affine, ex descr. futuri tantum notum" (B. H. *Gen.* 392.

ovulate ovary cells, rarely  $\infty$ -ovulate. Embryo exalbuminous. Leaves alternate (rarely opposite), often compound pinnate.—40 genera.

4. *PANCOVIEÆ*.—Polygamo-dicecious irregular flowers. Petals fewer in number (4) than the sepals (5). Irregular, incomplete, unilateral disk exterior to the androecium. Gynæceum excentric, with 1-2-ovulate ovary cells, rarely  $\infty$ -ovulate. Embryo exalbuminous. Leaves alternate, generally compound-pinnate.—22 genera.

5. *ÆSCULEÆ*.—Flowers irregular, polygamo-dicecious. Petals the same or fewer in number (4) than the sepals, joined more or less high. Gynæceum slightly excentric. Ovary cells 2-ovulate. Fruit capsular. Seeds exarillate. Embryo exalbuminous, conferruminate. Leaves opposite, compound-digitate.—2 genera.

6. *MELIANTHÆÆ*.—Flowers irregular, polygamo-dicecious. Androecium irregular, exterior to the disk. Ovules  $\infty$ . Fruit capsular or vesicular. Seeds albuminous, with or without aril. Embryo straight. Leaves alternate, pinnate, provided with stipules.—3 genera.

7. *AITONIEÆ*.—Flowers regular, 4-merous. Calyx gamosepalous. Stamens monadelphous, exterior to a cupula-shaped disk. Fruit capsular, vesicular. Cells 1-2-spermous. Seeds exalbuminous. Embryo bent. Leaves simple, alternate, or fasciculate. Flowers axillary.—1 genus.

8. *ACEREÆ*.—Flowers regular, polygamous or dicecious. Calyx and corolla isomerous (or apetalous flowers). Stamens more or less interior with reference to the circular disk, regular or equally lobate. Ovary with 1-2-ovulate cells. Fruit dry, with indehiscent cells (usually samaroid). Seeds destitute of aril and albumen. Leaves simple or compound-pinnate, opposite.—2 genera.

The variable characters employed to distinguish the series are then principally : the situation of the leaves, alternate or opposite, simple or compound, and, in the latter case, pinnate or digitate ; the regularity or irregularity of the flowers, the petals being equal to the sepals or else four in number, and the place of one of them remaining unoccupied, while the calyx is pentamerous ; the regularity or irregularity of the disk surrounding the gynæceum or only occupying one of its sides ; its position, relatively to the stamens to which it is generally exterior, while, more rarely, its elements are interposed to them or even become interior to the androecium, that is to say, placed close against the foot of the gynæceum ; the situation of this which is either central or excentric ; the organisation of the

fruit, whose seeds are or are not provided with an aril and whose embryo is generally exalbuminous, more rarely surrounded by a layer, usually thin, of this perisperm. The other characters, to which a lower value only can be allowed and which serve in general only to distinguish genera, are drawn from : the squamiform appendages which do or do not accompany the petals inwardly ; the number of the verticels of the androceum, sometimes complete and sometimes incomplete ; the number of ovules and their direction ; for there are often one or two in each cell, ascendent and more often descendent, and sometimes an indefinite number ; in which case they are arranged on two vertical rows ; the shape and consistence of the fruit, rarely fleshy, nearly always dry, but sometimes capsular and dehiscent, sometimes indehiscent and sometimes, in the latter case, prolonged in samaroidal wings ; the dimensions of the aril when it exists, for it may surround the whole seed or only form a cupula-shaped expansion at its base ; finally in the shape of the embryo, which is straight, arched, contortuplicate or twisted in a spiral.

There are two of these characters to which, it seems to us, we must be very careful not to accord an absolute value for distinguishing the tribes or series of this family : they are the position of the leaves and the regular or irregular form of the corolla. By the first, the *Æsculeæ* (*Hippocastaneæ*) are separated very distinctly, at first sight, from the allied genera of the group of *Sapindeæ*. But we can very well understand BENTHAM and HOOKER having included them in this series, and we have only kept them separate with hesitation, because we see genera such as *Valenzuelia*, having all the essential characters of the flowers and fruits like those of *Paullineæ* from which they cannot be separated, and presenting nevertheless an aspect and foliage completely exceptional with decussate leaves. As to the other character drawn from, the regularity or irregularity of their flowers, the number of the petals equal to or less than that of the divisions of the calyx, the greater or less excentricity of the gynæceum or its perfectly central insertion, finally from the symmetry or unsymmetry of the disk (which may surround circularly the central portions of the flower by a rampart equally developed everywhere or more on one side than the other, or which may even be totally wanting on one side and only represented on the other by a sort of crescent, a thick scale, simple or double, and sometimes of considerable dimensions) ; all these

differential traits, striking in the extreme types where we could not fail to appreciate them, diminish insensibly in numerous intermediate types and sometimes by an uninterrupted series of gradations, the observation of which will lead to the conclusion that there is only the most artificial line of demarcation between the tribes with regular and those with irregular flowers formerly separated by BLUME; between the series of A and B distinguished for the same reason by J. D. HOOKER in the group of *Sapindæ*; between those of the Soapworts and the *Pancovias*, which, following his example, we have preserved, as more convenient in practice, when it is a question of a family of which we have so much yet to learn. But it will not be impossible to improve on this in future as regards the natural characters. We do not think, for example, that *Diploglottis* ought to be relegated to a different series from *Cupania* to which it is attached by so many common characters, simply because its flower is irregular. We see the closest affinities between *Harpullia* and *Cossignia*, the first being regular, the latter irregular. We do not affirm that the *Hemiggyrosas* of BLUME, with their irregular flowers, are not however quite as closely allied to the irregular types *Anomosanthes* and *Scorodendron*, from which J. HOOKER was bound to separate them, as to *Pancovia* near which he was obliged to place them. A genus such as *Dittelasma*, separated considerably from *Sapindus* on account of its irregular floral type, has however such affinities with it that it was for a long time considered as congeneric. These are, it is plain, all questions which still require to be thoroughly examined into.

As to the organs of vegetation, the *Sapindaceæ* are very rarely herbs, suffrutescent at their base; and in that case they are climbers holding on by tendrils, as occurs so frequently when they become enormous woody bindweeds often described in standard works on account of their abnormal structure.<sup>1</sup> In *Paullinia*, *Senjania*, and *Urvillea*, for example, these stems are often characterised by the presence of a central woody body surrounding a pith and a medullary sheath, but itself surrounded, and sometimes with great regularity by three or more

<sup>1</sup> GAUDICH. *Rech. Sur l'Org. Végét.* (1841), t. 13, 18; in *Guillem. Arch. Bot.* ii. 501, t. 19.—A. RICH. *Elém.* éd. 10, 77, fig. 45.—MART. *Gelchrt. Anzeig.* (1842), 390.—TREVIR. in *Bot. Zeit.* (1847), 393.—SCHLEID. *Grundz.* (ed.

1861), 343, t. 161, 162.—CRUEG. in *Bot. Zeit.* (1851), 481.—SCHACHT. *Lerbuch*, ii. 57.—METTEN, in *Linnaea* (1847) 582.—A. JUSS. *Monogr. Malpigh.* (1843), p. i. 110.—OLIV. *Stem Dicot.* 10.



secondary and tertiary woody bodies, all united by a common bark surrounding them. The general appearance of these secondary and tertiary wooden bodies has led the greater number of authors to consider them as branches springing from the stem, and instead of being totally separated from it remaining united with it for a certain length. For this interpretation to be adopted without dispute, it would be necessary to show that the structure of each of these woody bodies is exactly the same on a smaller scale as that of the principal woody body. There has also been accorded them, in several works, a pith proper, itself enveloped in a medullary sheath surrounded by trachea, few in number, it is true. M. NÆGELI<sup>1</sup> has proved the existence of these vessels and of a central pith, but this is, in his eyes, only secondary, and it is easy to mistake them, the cellules composing it often having thick walls and resembling woody fibres, in the transverse section.<sup>2</sup> This author also supposes that in the stalk of the climbing *Sapindaceæ*, the formation of cambium is not everywhere simultaneous, so that there remains outside portions distinct internally, which may form subsequently, and on the spot, peripheric and secondary woody bodies. Perhaps the ulterior appearance of the latter and their close adherence for a great length to the principal woody zone may be explained by the phenomena of drawing up of the lateral branches, of which we see so many examples in the allied families and in the whole vegetable kingdom. There are cases, however, where this explanation is no more satisfactory than that proposed earlier; and L. NETTO,<sup>3</sup> who is the last who has given his opinion on the subject, has pointed out cases in which it would be totally inapplicable. According to him a *Serjania*, such as *cuspidata*, has triangular stems when young, bearing leaves on their three faces; and later on, they possess a central woody body, provided with a pith, and three peripheric bodies whose appearance is simultaneous, or even a little anterior to its own. Also, in *S. Dombeyana* there are peripheric woody bodies in considerable number; they appear at the same time as the central body, and it is outside them that, long afterwards, the tertiary woody bodies show themselves. There are *Sapindaceæ* whose stem contains but a single woody body the first year, and it is only in the second year that, in

<sup>1</sup> *Dickenwachst. d. Steng...* bei den *Sapindac.*  
Munich. (1854) in-8, tab.

<sup>2</sup> DUCHTRE, *Elém.* 170, fig. 82, 83.

<sup>3</sup> In *Ann. Sc. Nat. sér. 4*, xx. 167.

a peripheric parenchyma, are developed the masses of fine cellular tissue, afterwards becoming secondary woody bodies. There is finally the case where, always according to NETTO, a stalk of *Senjania* provided with two peripheric woody bodies, owes this arrangement to the separation in two of a central body divided by two large medullary rays into two woody islets which have been thrown back near the periphery to the state of secondary woody bodies. There are without doubt still many cases to be studied with reference to the arrangement of the tissues in these bindweeds.<sup>1</sup>

The *Sapinduceæ* are plants of hot countries, very abundant in the tropical regions of both worlds, rare in temperate countries; they are only represented in cold countries by the Maples, the *Staphylea* which are met with in Europe and North America, where also grow *Æsculus*, *Kæbreuteria* and *Xanthoceras* inhabiting northern China, and some species of *Dodonæa* and *Alcetryon* growing in New Zealand. Ten genera are common to both worlds. These are generally the most numerous in species; for together they number about three hundred and seventy-five, that is to say, half of the total number the whole family contains. The other half, that is to say, nearly four hundred species (described up to the present), divides itself with sufficient exactness into two parts; the one (about 220 species) peculiar to America, the other (180 species) belonging properly to the old world. This is however much richer in special genera than America, for it counts forty-six, while only eighteen are American. This arises especially from the large number of generic types peculiar, one part to tropical Africa and Madagascar, and the other to Australia, and which are without doubt much richer in species than we know of. The Australian genera, not met with elsewhere, and often remarkable for a distinct organisation, are *Akania*, *Distichostemon*, *Diploglottis*, *Pseudatalaya*, and *Diplopeltis*. The continental and insular African types have generally also a particular stamp, as may be remarked in *Erythrophysa*, *Cossignia*, *Chytranthus*, *Pseudopteris*, *Hippobromus*, *Pteroxylon*, *Eriandrostachys*, *Macphersonia*, *Lecunioidiscus*, *Crossone-*

<sup>1</sup> On the structure of the stems of *Æsculus* see LINK, *lc. Anat.* (1837), vii. 6-12.—A. RICH. *Élém.* éd. 10, 52, fig. 33; 62, fig. 36, 37.—SCHLEID. *Grundz.* (ed. 1861), 371, fig. 156.—HENFREY, *Micr. Dict.* art. *Wood*.—OLIV. *Stem.*

*Dicot.* 10.—On that of the Maples: C. H. SCHULTZ, *Nov. Act. Nat. Cur.* xviii. Suppl. ii. t. 24.—GRAY, *Intr. to Bot.* 118, 119, 121.—HENFREY, *loc. cit.*—SCHACHT. *Der Baum*, 195.—A. JUSS. *Élém.* 49, 52, fig.

*phelis*, *Eriocælum*, *Deinbollia*, *Melianthus*, *Bersama*, *Greyia* and *Aitonia*. The *Aitoniceæ* and the majority of the species of *Melianthea* are from south Africa. The flora of New Caledonia is already characterised by three special genera, *Podonophellium*, *Loxodiscus*, and *Melicopsidium*, having great affinities with *Cossignia* and *Erythrophysa*. This island is at the same time very rich in *Cupania*, a genus up to the present not very abundant in tropical Asia and Oceania, but which, as we know, is also one of the richest in species in South America and is also found well represented in the southern islands of Eastern Africa. The genera with sarmentose or volubile and cirrhous stems, such as *Serjania*, *Paullinia* and *Urvillea*, are essentially American. Was the species of *Paullinia* found in the old world introduced? With the suffrutescent and nearly herbaceous form of *Cardiospermum*, this same type is met with in all the tropical countries of the globe. In Chili on one side and in Beloochistan on the other, the family has representatives whose aspect and organs of vegetation present considerable modifications. *Stocksia*, in the latter of these countries, is only a prickly shrub with very slightly developed leaves; while the Chilian types, like *Bridgesia*, *Valenzuelia*, and *Llagunoa* are rigid shrubs with coriaceous leaves, simple entire or trilobate, sometimes opposite, like those of *Æsculus* and *Billia*. The latter are distinguished by their digitate nervation.

Of all *Sapinduceæ* the *Acereæ* inhabit the coldest reigons. *Dobinea* is limited to the mountains of temperate India, and the Maples extend, in both worlds, to all the cold or temperate regions of the northern hemisphere; they are unknown in the southern hemisphere, and are not pointed out in any part of Africa. If they abound in Eastern India, it is on the elevated slopes of the Himalayas and the neighbouring chains; and it is probable that in Java, where we also find them, they only grow at a certain height on the mountains. In the extreme east of Asia they also exist in large numbers. In Japan, for example, they are, says MIQUEL, "among the most characteristic of the woody flora," and twenty-three species have been already counted in that country, several being completely identical with those of the Himalayas. "The great majority of the Japanese Maples (17 species) are endemic," and three species are again met with in continental Asia: *Acer pictum*, observed in Northern China, Manchouria, and the Himalayas, and *A. Mono* and *tataricum*, also growing in the North of China. "The decided affinity with the

flora of North America shows itself very distinctly in the genus Maple. Thus the entire group of *Negundo* is limited to North America and Japan. *A. cissifolium* of Japan does not differ from *A. Negundo* of America." Many species are mentioned by the author, in both continents, as totally identical or at least as representing forms quite analogous to one another. As to the species belonging properly to America, of a total of twenty-five, brought together in his *Revisio Generis Acerum*, SPACH has enumerated nine which belong to that country. He considers ten as European, and the others are Asiatic. In Europe *A. Pseudoplatanus* has been observed at an altitude of nearly 5000 feet, although its native place may be far from being proved. It has been said to be indigenous to Denmark and Holland, but the fact is most open to dispute for France and the British Isles. The mode of distribution of the genera of the *Sabieæ* series is singular. The *Sabia*, that is to say the types with independent ovary, are all from Eastern Southern Asia and the Indian Archipelago; whilst the *Meliosma*, with plurilocular ovary, most of them belonging to the same regions, extend though by a small number of species (those which have served as types for the genera *Oligostemon*, *Ophiaogylon*, and *Phoranthus*) to a very distant point in the two Americas, to Mexico, Columbia, North Brazil and Guiana.

The *Sapindaceæ* are placed between the *Terebinthaceæ* and *Malpighiaceæ*. They are distinguished from the first by their irregular flowers in the series of *Pancovicæ*, *Æsculeæ*, and *Meliantheæ* and generally in the series with regular flowers by the situation of their disk almost always exterior to the stamens. When it is exceptionally interposed or even interior to them, the ovule is usually ascendent with the micropyle exterior and inferior, while that of the *Terebinthaceæ* is directed upwards. As however this direction of the ovule is also observed sometimes among the *Sapindaceæ*, it must be noticed that they have not the balsamic resinous or acrid juice of the *Terebinthaceæ*, nor the uniovulate, unilocular ovary of the *Anacardiææ*, surmounted generally by several styles, and that the *Terebinthaceæ* have not the aril so frequently developed in the *Sapindaceæ*. These differ from the *Malpighiaceæ*, of which they frequently have the regular flower and the samaroid fruit, in the large development of the disk and in the ovules. The glands of the

calyx, is frequent among the *Malpighiaceæ*, are not observed in this family, where opposite and simple leaves are very rare exceptions, whilst they are the rule among the *Malpighiaceæ*. On the whole, these, notwithstanding their close affinities with the regular *Sapindaceæ*, are very easily distinguished from them in practice, by not having the disk, or the ovules being descendent and not ascendent, or the sepals glanduliferous, or by the character of the leaves; and if one of these characters is wanting, the others remain and suffice for distinction. Many other families have a more or less distant resemblance with these: the *Celastraceæ*, to which the *Staphylleæ* were formerly joined, have neither irregular flowers nor compound leaves; their stamens are generally equal in number to the petals, shorter than them and exterior to the disk. The embryo is not bent as that of the *Sapindaceæ* often is. The *Meliaceæ* and *Rutaceæ* may have very nearly the organs of vegetation and the leaves of the *Sapindaceæ*, but the latter are easily distinguished by the pellucid punctuations of the leaves and the odour of the essential oil. Moreover, like the *Meliaceæ* with solitary or few ovules, they have the micropyle turned upwards and outwards, and not outwards and downwards, consequently the radicle of their embryo is superior, and not inferior as that of the *Sapindaceæ* usually is. The *Leguminosæ* sometimes present a superficial resemblance with the *Sapindaceæ*, by several *Casalpinieæ* having the concave receptacle, an excentric gynæceum, and ciliate or fimbriate petals, exactly like *Erythrophysa* or certain species of *Pancovia*. It is known that one of the species of the latter genus was assigned to the genus *Afzelia*. But this confusion can only exist when we have only the male flowers before us; for the gynæceum with unilocular ovary of *Leguminosæ* could not be taken for that of a *Sapindaceæ* having an ovary with several cells and axile placentas.

The useful species<sup>1</sup> of this family have very different properties. The best known are those to which the Soapworts owe their name. A bitter principle exists in most of their organs, making water frothy and giving it the qualities of soap. But there is besides this, in these plants, something acrid which rapidly destroys linen.

<sup>1</sup> ENDL. *Eschirid.* 562.—LINDL. *Fl. Med.* 121; 591.—ROSENTH. *Syn. P. Diaphor.* 776, 1151. *Veg. Kingd.* 383.—GUTH. *Drog. Simpl.* ed. 6, iii.

In the West Indies the fruits of *Sapindus Saponaria*<sup>1</sup> (fig. 353) are especially used for washing; in Guiana, those of *S. aborescens*<sup>2</sup> (fig. 351, 352) and *frutescens*<sup>3</sup>; *S. rigida*<sup>4</sup> in Bourbon and Mauritius; *S. senegalensis*<sup>5</sup> in tropical western Africa; and *S. divaricatus*<sup>6</sup> in Brazil. The pericarp of the latter is thin, translucent, filled with a viscid juice. Its seeds, globular, black, and smooth, are used, like those of many species of the genus, to make necklaces. Few species have an edible pericarp, because there is often a smell and taste of turpentine. Those of *S. emarginatus*<sup>7</sup> are eaten, it is said, in Georgia and Carolina, and the negroes of the Senegal seek that of *S. senegalensis* which has a vinous and sugary flavour. The fruits of *S. esculentus*<sup>8</sup> in Brazil and those of *S. fruticosus* in Malabar are also edible. The bark and root of several species,<sup>9</sup> especially of *S. Saponaria* are, notwithstanding their acerbity, used as astringent and tonic-bitter remedies. The tincture of the fruit has been recommended for chlorosis, and the pulverised seeds are used for poisoning rivers. The *Euphorias* have quite a different kind of utility in the tropical countries of the old world. The best known and most frequently cultivated is *E. Longana*<sup>10</sup> (fig. 354, 355), whose seed is surrounded by a sapid, yellowish fleshy aril, sweetish and acidulated, sought for as an aliment, refreshing, and dried like plums to keep them during the bad season. It has unfortunately a vinous taste and is smaller and not so good as that of *Nephelium Litchi*<sup>11</sup> (fig. 356-358), which is red, pulpy, acidulate and sweetish, with an

<sup>1</sup> L. *Spec.* 526.—DC. *Prodr.* i. 607.—COMMEL. *Hort.* i. 94.—GUIN. *op. cit.* iii. 591.—ROSENTH. *op. cit.* 779. The Panama Wood of commerce, used for cleaning stuffs and sold in large pieces in Paris, is probably the bark of this species and of some others. It is often too voluminous to belong to *Quillaja Saponaria*, of the family of *Rosaceae* (see *Hist. of Pl.* i. 453). It makes water very soapy, and when smelt, especially after having been recently broken, causes energetic sneezing; which seems to be, in this inodorous bark, produced by the mechanical action on the mucous membrane of the needle-like crystals with which it is crammed.

<sup>2</sup> AUBL. *Guian.* i. 357, t. 139.

<sup>3</sup> AUBL. *op. cit.* 355, t. 138.

<sup>4</sup> POIR. *Diet.* vi. 663, n. 2.

<sup>5</sup> POIR. *Diet.* vi. 666, n. 12.—DELESS. *Je. Sol.* iii. 22, t. 28.—GUILLEM. et PERR. *Fl. Seneg. Tent.* i. 117 (*Cahouart* (ADANS.), *Kéuer*, *Kellrr* of the negroes).

<sup>6</sup> See GUIB. *op. cit.* 591 (*Pao de sabon*).

<sup>7</sup> VAHL, *Symb.* iii. 54.

<sup>8</sup> CAMBESS. *A. S. H. Fl. Bras. Mer.* i. 391 (*Pittombero*).

<sup>9</sup> There are mentioned as having the general properties of the genus the *S. inæqualis* DC. *rigidas* AIT. *abruptus* LOUR. *naduriensis* PERR. *laurifolius* VAHL (ROSENTH. *op. cit.* 779), often described as the *S. Saponaria*, under the names of *Soap Wood*, *Ramon Wood*, *Soap-ball Tree*. The fruits are still called *Soap Apples*. The viscid juice has been used in cases of uterine hæmorrhage.

<sup>10</sup> LAMK. *Diet.* iii. 574.—BUCH. *Coll. t.* 99.—DC. *Prodr.* i. 611.—TURP. in *Diet. Sc. Nat. Atl.* t. 172.—*Dimocarpus Longan* LOUR. *Fl. Cochinch.* 233 (*Longane*, *Êil-de-dragon*, *Boa*, *Boba*).

<sup>11</sup> *Litchi chinensis* SONN. *Voy. t.* 129.—*Euphoria punicea* LAMK. *Diet.* iii. 573; *Ill.* t. 306.—TURP. *loc. cit.* t. 173.—*E. Litchi* DESF. *Cat.* 169. DC. *Prodr.* i. 611, n. 1.—*Scytalia chin-*

aftertaste of muscatel; it is also dried, and preserves and drinks are prepared from it and administered to fever patients and persons attacked by bilious maladies. The *Ramboutan* is *N. lappaceum*<sup>1</sup> of tropical Asia. The aril is employed for the same purposes; it is said to be delicious. The seed is considered bitter and narcotic. Another of the *Sapindaceæ* with edible fruit is *Cupania sapida*,<sup>2</sup> from Guinea, which has been transported to India and the Antilles, and is used for seasoning stews; with sugar and cinnamon a cooked preserve is prepared, used for the treatment of diarrhœa. Boiled under the cinders, the fruit is applied as a maturative to abscesses. The odour is agreeable; women employ as a cosmetic a perfumed water obtained from it by distillation. In many other *Sapindaceæ*, either the pericarp, aril, or embryo are eaten. In *Melicocca bijuga*,<sup>3</sup> of the Antilles, the pulp of the pericarp and the grilled kernel are both in use. The seeds of *Cupania americana* have the flavour of chestnuts or sweet acorns, and are used, on the banks of the Orinoco, to make a fermented liquor. The aril of *Diploglottis Cunninghami*<sup>4</sup> (fig. 378-381) is fleshy, acid, and sweet. In *Schmidelia edulis*,<sup>5</sup> the fruit, said to be much sought after by the Brazilians, has a mild and sweet taste. In the Isle of France an excellent jelly is again prepared with imperfectly ripe fruits. In Java a kind of cider is made from the pericarp of *Pancovia edulis*<sup>6</sup> (fig. 375-377). At the Cape is eaten, under the name of *Wild Plum*, that of *Pappæa capensis*<sup>7</sup> (fig. 359, 360) assigned by us to the genus *Nephelium*.<sup>8</sup> The seeds are oleaginous. Many species of *Cupania*<sup>9</sup> and *Paullinia* have edible seeds. The most celebrated in America is that of *P. sorbilis*<sup>10</sup> (fig. 382, 383), having on

ensis GERTN. *Fruet.* i. t. 42, fig. 3.—*Dimocarpus Litchi* LOUR. (*Osa, Usao* (RAY), *Ly-chi, Litchi ponceau*).

<sup>1</sup> L. *Syst.* iv. 236.—LAMK. *Ill.* t. 764.—*Dimocarpus crinita* LOUR. *op. cit.* 234.—*Euphoria Nephelium* DC.

<sup>2</sup> *C. edulis* SCHUM. et THÜNN. *Beskr.* 190.—*Blighia sapida* KOEN. in *Ann. Bot.* (1806), ii. 571.—DC. *Prodr.* i. 609.—BAKER, *Fl. Trop. Afr.* i. 426.—ROSENTH. *op. cit.* 780.—*Aakesia Africana* Tuss. *Fl. Ant.* i. 66, t. 3.—*Bonnania nitida* RAFIN.

<sup>3</sup> L. *Spec.* 495.—DC. *Prodr.* i. 615.—*M. Carpodæa* J. *Mém. Mus.* iii. 187, t. 4.—*Melicocca bijugatus* JACQ. *Amer.* 108, t. 72. *M. trijuga* J., type of the genus *Schleichera*, has also an edible fruit.

<sup>4</sup> See p. 415, n. 7.

<sup>5</sup> A. S. H. *Pl. Us. Bras.* t. 67. *S. serrata* C. (*Ornithophe serrata* ROXB.) is employed in

Malabar as anti-diarrhœic. Its root is strongly astringent, the same as that of *S. Africana* DC. In Cochinchina the leaves and bark of *S. cochinchinensis* DC. are applied to wounds and bruises. (*Allophylus ternatus* LOUR. *op. cit.* 232).

<sup>6</sup> *Erioglossum edule* BL. *Rumphia*, iii. 119, t. 166.—BENTH. *Fl. Austral.* i. 454.—*Sapindus rubiginosus* ROXB. *Pl. Corom.* i. 44, t. 62.—*S. edulis* BL. *Cat. Hort. Buitenz.* 64 (*Kilaleyo Sundaic.*).

<sup>7</sup> ECKL. et ZEYH. *Enum.* 53.—PAPPE, *Fl. Med. Cap.* 3.—HOOK. *Icon.* 352.—*Sapindus Pappæa* SOND. *Fl. Cap.* i. 241.—*Kiggelaria integrifolia* E. MEY.

<sup>8</sup> See p. 351.

<sup>9</sup> ROSENTH. *op. cit.* 780, 1152.

<sup>10</sup> MART. *Mat. Med. Bras.* 59; *Pl. Med. et Econ. Bras.* *incd.* t. 110.—ENDL. *Echirid.* 563.—ROSENTH. *op. cit.* 777.

a small scale the appearance of a seed of the horse-chestnut, and used in Brazil to prepare the paste called *Guarana*.<sup>1</sup> With the coarsely pulverised seeds and water a paste is made, having the colour of chocolate, and formed into cylindrical cakes. Travellers often carry these cakes to dilute with water and make an antifebrile refreshing drink, of a slightly astringent taste, and whose properties are, it appears, very nearly the same as those of coffee.<sup>2</sup> The seed of the horse-chestnut<sup>3</sup> (fig. 404-408) contains a very large fleshy embryo, and it has been long regretted that the immense amount of its fecula was not used as an aliment. Animals with some rare exceptions do not eat it easily. It is, however, easy to extract a pure fecula from these seeds, by treating the embryo, reduced to a pulp, with alcalinised or ordinary water, and it can also be transformed into sugar, and then into alcohol. Besides these substances, the horse-chestnut contains an oil extracted from it for medical purposes, and recommended outwardly for rheumatic and gouty affections. It has, like many other *Sapindaceæ*, the property of rendering water frothy and soapy, consequent, it is said, on its containing saponine. Esculine has also been extracted from it, to which febrifuge and anti-periodic properties have been assigned, similar to those of *Quinquina*.<sup>4</sup> The fruit of *Æsculus macrostachys*<sup>5</sup> is eaten cooked in Carolina, and the seed of several species of the section *Pavia*<sup>6</sup> has properties analogous to those of *Æsculus Hippocastanum*. The seeds of *Staphylia trifoliata*<sup>7</sup> contain a sweet oil; they are sometimes eaten like Pistachios.

<sup>1</sup> GUIB. *op. cit.* iii. 592.—FOURN. *Journ. Pharm. et Chim.* sér. 3, xxxix. 291.

<sup>2</sup> It is said that the *Guarana* contains caffeine.

<sup>3</sup> *Æsculus Hippocastanum* L. *Spec.* 488.—DC. *Prodr.* i. 597.—GREN. et GODR. *Fl. de Fr.* i. 324.—MÉR. et DEL. *Diet. Mat. Méd.* i. 87.—NEES, *Pl. Med.* t. 375.—LINDL. *Fl. Med.* 124; *Veg. Kingd.* 384.—ENDL. *Enchirid.* 565.—GUIB. *op. cit.* iii. 593.—ROSENTH. *op. cit.* 783.—REV. *Fl. Méd. du XIX<sup>e</sup> Siècle* ii. 296.—*Hippocastanum vulgare* T. *Inst.* 612, t. 382.—GÆRTN. *Fruct.* ii. t. 111.—*Castanea equina* DOD. *Pempt.* 814. This plant was brought from Constantinople to Paris in 1615.

<sup>4</sup> The flower of *Æsculus* has been employed as a cosmetic; it has been introduced into stearine candles. The bark of the tree, in powder or in decoction, has been particularly recommended as tonic, detersive, antiseptic, and

febrifuge. It has been used for dressing ulcers of bad appearance. The roots are considered to be poisonous in America (*Poison root*.)

<sup>5</sup> MICHX. *Fl. Bor.-Amer.* i. 220.—*Æ. parviflora* WALT. *Carol.* 128.—*Pavia macrostachya* DC. *Prodr.* i. 598, n. 1.—*P. edulis* POIT. *Arbr. Frut.* t. 88.—*Macrothyrus discolor* SPACH, *Ann. Sc. Nat.* sér. 2, ii. 61.

<sup>6</sup> Especially the *Æ. glabra* W. *discolor* PURSH, *rubicunda* LODD. *californica* NUTT. (ROSENTH. *op. cit.* 784.)

<sup>7</sup> L. *Spec.* 386.—SCHM. *Östr. Baum.* ii. t. 81.—DC. *Prodr.* ii. 2.—ENDL. *Enchirid.* 573. *S. pinnata* (fig. 335, 339-341) has the same properties (vulg. *Nez coupé*, *Patenôtier*). Its root yields a red dye. *Triceros japonica* (p. 343, note 1, fig. 336-338) has a bitter and astringent bark, used in Japan for treating dysentery and chronic diarrhoea (*Gonzoui* of the Japanese).



With all these useful products furnished by the parts of fructification of the *Sapinduceæ*, we find, on the other hand, dangerous and highly poisonous substances. The majority of the American species of *Serjania* and *Paullinia* are poisonous or at least doubtful. The juice of *S. lethalis*<sup>1</sup> is considered in Brazil to be narcotic. The Indians use the plant to intoxicate fish. *S. noxia*<sup>2</sup> is supposed to poison cattle. It is from different species of *Serjania* that, in Brazil, the *Lecheguana* wasp doubtless gathers the materials of that honey of which A. SAINT-HILAIRE himself experienced the pernicious effects described by him in a graphic and celebrated narrative.<sup>3</sup> *Magonia pubescens*<sup>4</sup> (fig. 399-403) is quite as much feared in the same country; its leaves serve, it is said, to depopulate the water-courses, and the honey gathered from its flowers is also considered to be highly doubtful.<sup>5</sup> *Paullinia pinnata*,<sup>6</sup> a species found in both America and tropical Africa, is considered, in the latter country especially, to be a terrible poison. The negroes employ its roots and seeds. The Indians who inhabit the Brazilian forests squeeze out, it is said, the juice of the leaves and use them as a vulnerary. On the banks of the Orinoco, *P. Cupana*<sup>7</sup> is considered to be wholesome. A sort of yellowish paste obtained from the bruised leaves of this plant by macerating them in water, wrapped, with manioc flour, in the leaves of the Palm or Banana, is mixed with drinking water. The species of *Dodonæa* sometimes have peculiar properties, owing doubtless to the resinous substance exuding from several species. *D. viscosa*,<sup>8</sup> growing in all the warm countries of the globe, is used to prepare astringent baths and fomentations. The wood of *D. dioica* ROXB. is prescribed in India for flatulent colics. At the Cape, *D. Thunbergiana* is considered to be a mild purgative and febrifuge. There are in this family oily plants, such as *Alectryon excelsum* (fig. 365), a tree from New Zealand, *Pappæa*, *Æsculus*, *Cardiospermum*,<sup>9</sup>

<sup>1</sup> A. S. H. *Pl. Rem. Brés.* 235; *Fl. Bras. Mer.* i. 367.—ROSENTH. *op. cit.* 777. *Pl. Australis* A. S. H. (in *Mém. Mus.* xii. 334) is equally poisonous.

<sup>2</sup> A. S. H. *loc. cit.* ii. 363.

<sup>3</sup> *Relation d'un empoisonnement cause par la miel de la Guêpe Lecheguana* (in *Mém. Mus.* xii. (1825), 293).

<sup>4</sup> A. S. H. *Fl. Bras. Mer.* i. 394. *M. glabrata* A. S. H. has the same properties.

<sup>5</sup> *Serjania mexicana* W. (*Paullinia mexicana* L.), an acrid, dangerous plant used in medicine as an antisyphilitic and antirheumatic.

<sup>6</sup> L. *Spec.* 366.—DC. *Prodr.* i. 604, n. 5.—*P.*

*senegalensis* J. in *Ann. Mus.* iv. 348.—*P. Africana* G. DON, *Gen. Syst.* i. 661.—*P. urata* SCHUM. et THÖNN. *Beskr.* 195. Also employed in Brazil and for ophthalmia and amaurosis. *P. grandiflora* A. S. H., a Brazilian species, is considered in that country to have the same properties.

<sup>7</sup> H. B. K. *Nov. Gen. et Spec.* v. 117.

<sup>8</sup> L. *Mantiss.* 238 (part.).—DC. *Prodr.* i. 616.

<sup>9</sup> The Chinese are said to employ as a pot-herb the *Heart Pea* or *C. Halicacabum* (fig. 382), of which they eat the leaves, fruit, and seeds.

and several *Paullinia* and *Serjania*, and it is from the embryo that the fatty matter is extracted; species with soluble gum like *Kæbreuteria paniculata*<sup>1</sup> (fig. 385-390); lastly, others are used to extract sugar from, as *Acer saccharinum*<sup>2</sup> in North America, and with it, several other species such as *A. pensylvanicum*<sup>3</sup> (fig. 418-420), *rubrum*,<sup>4</sup> and *eriocarpum*.<sup>5</sup> Sugar is also contained in the sap of *A. campestre*,<sup>6</sup> *Pseudoplatanus*,<sup>7</sup> and *platanoides*; <sup>8</sup> but it is extracted much less frequently. In Canada and the central parts of the United States, the trunk of the Sugar Maple is notched, about March, with a large auger with which two parallel holes are bored obliquely upwards at nearly half a yard from the ground. By means of tubes of elder, the juice is conducted into the receptacles placed at the foot of the tree; it is then evaporated at a very brisk fire. The liquor, on the removal of a scum which forms, becomes syrupy, is filtered through woollen tissue, and then poured into a crystallizing-pan, where a raw sugar is obtained which may be refined like beetroot sugar and become completely white. The flow of sap amounts to as much as 17 or 18 pints a day, for more than a month, and may produce from a single stem four and a half pounds of sugar during that period. The same tree may thus yield sugar for thirty years, provided that by piercing the trunk in different places each year, it is allowed to repair its pith and wood.<sup>9</sup> The Black Maple<sup>10</sup> of North America, closely allied to the preceding, is equally used. The other species we have mentioned also contain sugar in their sap, but it is never turned to account. Different species of *Acer*, as *A. campestre*, *A. platanoides*, and *A. rubrum*, have an astringent bark used for drying and preparing skins. Several species are used for the extraction of American potash, of which there is a large proportion, it is said, in

<sup>1</sup> See p. 417, note 4.

<sup>2</sup> L. Spec. 1496.—MICHX F. *Arbr.* ii. t. 15,—TRATT. *Arch.* i. n. 3, c. ic.—DC. *Prodr.* i. 595, n. 19.—ROSENTH. *op. cit.* 772.

<sup>3</sup> L. Spec. 1496.—*A. striatum* LAMK. *Dict.* ii. 381.

<sup>4</sup> L. Spec. 1496.—MICHX, *op. cit.* t. 14.—DESF. *Ann. Mus.* vii. 414, t. 25.

<sup>5</sup> MICHX, *Fl. Bor.-Amer.* ii. 253.—DESF. *loc. cit.* 412.—*A. dasycarpum* W. Spec. iv. 985 (White maple).

<sup>6</sup> L. Spec. 1497.—DC. *Prodr.* n. 8.—GREN. et GODR. *Fl. de Fr.* i. 322 (Common maple, Warm

wood, *Anzerante* (Fr.), Little maple).

<sup>7</sup> L. Spec. 1496.—DUHAM. *Arbr.* i. t. 36.—GREN. et GODR. *Fl. de Fr.* i. 321 (Great maple, Sycamore, White maple).

<sup>8</sup> L. Spec. 1496.—DUHAM. *Arbr.* i. t. 10, fig. 1.—GREN. et GODR. *Fl. de Fr.* i. 322 (Plane, *Pléne* (Fr.), False Sycamore).

<sup>9</sup> AVEG. *Journ. Pharm. et Chim.* sér. 3, xxxii. 280.—GUIB. *Drog. Simpl.* éd. 6, iii. 599 (this sugar is saccharose).

<sup>10</sup> MICHX, *Arbr.* ii. 238, t. 16.—DC. *Prodr.* n. 20.

the cinder of *A. rubrum* and *saccharinum*. The root of *A. Pseudo-platanus* contains a red tinctorial matter. Its bark has been employed as astringent. The fruit of *A. tartaricum*<sup>1</sup> has been recommended for intermittent fevers, and the Kalmucks eat its seeds. *A. Negundo*<sup>2</sup> (fig. 426) has a sweet sap like *A. saccharinum* and is, we are assured, used like it by the Americans. The majority of Maples are, moreover, sought after for the quality of their wood. That of *A. campestre* is whitish, resembling somewhat that of the Citron employed by cabinet-makers, turners, musical-instrument-makers, and gunsmiths. The excrescences often borne by the stem are sought after for fancy turning. *A. eriocarpum* is used for making porringers, and inlaid work. Likewise that of *A. Negundo*, *monspessulanum* L., and *Opulus* W. The false Sycamore is useful to joiners, turners, and musical-instrument-makers, who make bassoons from it. That of the Sycamore is used even for building purposes, like that of *A. nigrum* and *saccharinum* in America. Of all, very good charcoal is made. *Æsculus Hippocastanum* has also a useful wood; cases, boxes, and numerous fancy articles are fabricated which are especially sold at Spa, decorated generally with oil paintings. In warm countries is employed the wood of *Pancovia edulis*, *Stadmania Sideroxyylon* (to us a *Nephelium*), and *Diploglottis Cunninghami* (fig. 378-381), which is "Ironwood" and that of *Schleichera trijuga*. At the Cape of Good Hope, the wood of *Hippobromus alatus*<sup>3</sup> is sought after, also that of *Pteroxyylon utile*<sup>4</sup> (fig. 366-369), being as hard, it is said, as mahogany. It burns when not completely dry, and is used by the Hottentots for lighting fires. The powder causes sneezing. There are few ornamental trees in this family besides the maples and horse-chestnuts. Let us mention, however, the species of *Kœlreuteria*, cultivated everywhere, and *Xanthoceras* (fig. 372-374), which, being a native of Mongolia, will be without doubt a rustic tree in our gardens.

<sup>1</sup> L. *Spec.* 1495.—PALL. *Fl. Ross.* t. 3.—DC. *Prodr.* n. 2 (Red maple of Tartary).

<sup>2</sup> L. *Spec.* 1497.—MICHX, *Arbr.* ii. t. 16.—*Negundo fraxinifolium* NUTT. *Gen. Amer.* i. 253.—DC. *Prodr.* 196, n. 1.—*N. aceroides* MENCH

(Maple with ash leaves).

<sup>3</sup> ECKL. et ZEYH. *Fl. Cap.* 241 (*Pardopsis*).

<sup>4</sup> ECKL. et ZEYH. *loc. cit.*—PAPPE. *Silv. Cap.* 8.—HARV. *Thes. Cap.* t. 17 (*Nieshout*).

## GENERA.

## I. STAPHYLEÆ.

1. **Triceros** Lour.—Flowers regular hermaphrodite; receptacle rather convex or rather concave. Calyx 5-fid, imbricated, often persistent. Petals 5, alternate, imbricated. Stamens 5, alternipetalous, inserted perigynously or subhypogynously with perianth on margin of receptacle; filaments free, clothing disk of receptacle, crenate or lobate, exterior; anthers introrse, longitudinally 2-rimose. Carpels of central germen 3 or more rarely 2; germens sometimes partly inferior, either free, or connate within at base or more or less high; ovules in each 1, 2, or more rarely more, 2-seriate inserted in internal angle, either subhorizontal, or ascendent; micropyle extrorse inferior; apical styles free, more or less connivent or coadunate to apex; apex capitellate stigmatiferous. Fruit carpels 2, 3, either quite free, dry follicular and finally longitudinally rimose within, or more or less connate and dry or coriaceous, indehiscent more rarely fleshy and except for discrete styles quite connate. Seeds 1- $\infty$ ; outer coat hard or more or less fleshy arilliform; albumen fleshy; cotyledons of straight embryo orbicular or ellipsoid flat or plano-convex; radicle short introrse or inferior.—Trees or glabrous shrubs; leaves opposite simple or very often imparipinnate, sometimes 3-foliate; stipules deciduous or 0; folioles sometimes stipellate opposite coriaceous serrulate; flowers in axillary or oftener terminal more or less compound ramified cymiferous racemes; branches opposite or more rarely alternate. (*South America and temp. Asia.*) See p. 342.

2. **Staphylea** L.—Flowers generally hermaphrodite regular (nearly of *Triceros*); receptacle rather convex or rather flat. Perianth and 5 stamens (of *Triceros*), exterior to somewhat flat lobed disk.

Carpels 2, 3, connate in germen partite nearly to base; ovules in each cell  $\infty$ , 2-seriate inserted at internal angle, more or less ascendent. Fruit capsular membranous vesiculate-inflated, 2-3-lobed; cells 2, 3, inwardly at apex rimose hians. Seeds in cells few subglobose; testa outwardly osseous; embryo straight albuminous.—Ramified shrubs; leaves opposite stipulate, 3-foliate or pinnate; folioles stipellate, in vernation involute; flowers in nutant axillary subsimple or ramified cymiferous racemes; pedicels bracteate, articulate to middle. (*Europe, temp. Asia, and America.*) See p. 344.

## II. SABIEÆ.

3. **Sabia** COLEBR.—Flowers hermaphrodite or more rarely polygamous, usually 5-merous; receptacle concave. Sepals free, imbricated. Petals same in number opposite, imbricate. Stamens same in number oppositipetalous; filaments free inserted under central 5-angular or 5-lobed process of receptacle; cells of anthers 2, adnate to connective or 2-dymous, introrsely, laterally or extrorsely rimose. Germen inserted at summit of central process of receptacle; carpels 2, or more rarely 3, free; ovules in germen 2, collateral or sub-superposed, inserted at internal angle, ascendent; micropyle introrse inferior; styles 2, 3, free, capitellate stigmatiferous more or less coherent to apex. Fruit carpels 1-3, dry or drupaceous, free, inside persistently rostrate with subbasilar style, dorsally gibbous; putamen outwardly rugose ligneous. Seeds reniform; testa punctate; albumen scanty or membranous; cotyledons of more or less curved embryo rather flat or undulate; radicle inferior incurved. Sarmen-tose or scandent shrubs; buds squamate; leaves alternate petiolate entire; flowers (usually præcose) axillary, solitary, more or less ramified-cymiferous, 2-bracteolate. (*Temp. and trop. Asia.*) See p. 345.

4. **Meliosma** BL.—Flowers hermaphrodite or polygamous-dicæious, oftener 3-merous; sepals 3-5 unequal, imbricated. Petals 3, thick, imbricated or more rarely valvate, inwardly accrescent with large 2-lobed or 2-cucullate scales unequally cut, sometimes linear (*Phoxanthus*). Stamens generally 2 fertile, alternipetalous; filaments free linear flat, dilated at apex below anther to unequally-

lobed cupule (augmented connective?) ; anthers basifixed, 2-dymous ; cells subglobose or shortly ovoid erect, dehiscant to apex by linear short or poriform mouth. Gynæceum free, surrounded at base by cupular unequally-3-5-dentate disk ; teeth sometimes 2-fid ; germen 2-3-locular, style apical ; apex stigmatose subentire, acute or more rarely 2-lobed. Ovules in cells 2, inserted at internal angle ascendent more or less completely anatropous ; micropyle extrorse inferior. Fruit drupaceous or finally subdry, indehiscent or more rarely hence hardly dehiscing, obliquely subglobose, whence sometimes subcarinate (*Ophiocaryon*) ; putamen osseous or crustaceous. Seed ascendent ; cotyledons of exalbuminous embryo more or less conduplicate or much (*Ophiocaryon*) contortuplicate ; radicle incurved short or long thick (*Phoxanthus*) or flexuous and dilated at apex (*Ophiocaryon*).—Trees or shrubs ; leaves alternate, simple or pinnate ; folioles entire or serrate ; flowers in much ramified compound cymiferous racemes often bracteate. (*Trop. and subtropical Asia and America*). See p. 346.

### III. SAPINDEÆ.

5. **Sapindus** PLUM.—Flowers regular hermaphrodite or polygamous ; receptacle usually depressed. Sepals 4, 5, imbricate. Petals same in number alternate, imbricate, inwardly naked or oftener enlarged above the claw by 1, 2, glabrous or variously pilose scales. Disk clothing receptacle and externally annular or cupular encircling on all sides interior stamens. Stamens (in female flower effete) 10, 2-seriate of which 5 are alternipetalous, longer, or 4-8, or more rarely 11-∞ ; filaments hypogynous free, often pilose ; anthers introrse versatile, 2-rimose. Germen (rudimentary in male flower) 3- or more rarely 2-4-locular, 2-4-lobed ; style terminal, 2-4-lobed stigmatiferous at apex. Ovules in cell solitary, situated at base of internal angle ascendent anatropous ; micropyle extrorse inferior. Fruit 1-4-cocceous ; fertile cocci 1-4, globose or oblong, fleshy or coriaceous, indehiscent, sterile cocci at base 1-3 minute stipate. Testa of exarillate exalbuminous seed membranous or crustaceous ; hilum wide ; cotyledons of straight or curved embryo thick fleshy ; radicle short incurved penetrating more or less within testa.—Trees or shrubs sometimes scandent ; leaves alternate exstipulate ; simple or 1-∞-foliolate pinnate ; folioles entire or rarely serrate ; flowers in

terminal and axillary more or less ramified-compound cymiferous racemes. (*All trop. and subtrop. reg.*) See p. 348.

6. **Euphoria** J.<sup>1</sup>—Flowers polygamous-diœcious (nearly of *Sapindus*); sepals 5, rather large, subvalvate or imbricated. Petals 5, or 4, 3 (sometimes 0), esquamate or squamate. Stamens 6–10, interior to regular disk; anthers oblong introrsely rimose. Germen central, 2–3-lobed; 2, 3, cells and ovules of *Sapindus*; style erect between lobes more or less deeply 3-lobed; lobes recurved, inwardly stigmatiferous. Fruit 1–3-coccous; cocci ovoid or globose crustaceous, smooth or shortly tuberculate, sometimes finally unequally broken. Seed subglobose, enclosed by pulpy aril; testa coriaceous; cotyledons of exalbuminous embryo thick plano-convex; radicle short inferior.—Trees; leaves alternate imparipinnate; subopposite folioles and inflorescence of *Sapindus*, terminal or axillary. (*Trop. Asia and Oceania*.<sup>2</sup>)

7. **Nephelium** L.<sup>3</sup>—Flowers polygamous-diœcious (nearly of *Sapindus* or *Euphoria*); calyx small cupular, 4–6-dentate; teeth short, valvate, slightly imbricate or not contiguous. Petals 4–6, villous or sometimes squamate within, more rarely 0. Stamens interior to completely annular pubescent or glabrous disk 5–10, oftener 8; anthers introrse (effete in female flower). Germen central (rudimentary in male flower) 2–3-dymous or 2–3-lobed; cells 2, 3, 1-ovulate; style branches 2, 3, often recurved stigmatiferous at apex. Fruit cocci 1–3, coriaceous or subfleshy, sometimes tuberculate aculeate or bristling with spines, indehiscent or more rarely subtransversely (*Spanoghea*<sup>4</sup>) or longitudinally and folliculately (*Cubilia*,<sup>5</sup> *Stadmania*<sup>6</sup>) dehiscent. Seed solitary in cocci semi-immersed in pulpy aril (*Spanoghea*) or entirely involute; cotyledons of exalbuminous embryo

<sup>1</sup> Gen. 248 (part.).—B. H. Gen. 406, n. 48.

<sup>2</sup> Spec. 8–10, of which 1 is often cultivated, scil. *E. Longana* LAMK. Diet. iii. 574.—DC. Prodr. i. 611, n. 2.—Bot. Mag. t. 4096. Others generally enumerated under *Nephelium* are always distinguished by larger free sepals. CAMBESS. in Mém. Mus. xviii. 30.—BL. Rumphia, iii. 102.—BENTH. Fl. Austral. i. 468.—MOON, Cat. 31 (*Dimocarpus*).—THW. Enum. Pl. Zeyl. 57.

<sup>3</sup> Mantiss. n. 1277.—CAMBESS. Mém. Mus. xviii. 30 (part.).—SPACH, Suit. à Buffon, iii. 61 (part.).—ENDL. Gen. n. 5617 (part.).—B. H. Gen. 405, n. 47.—H. BN. Payer Fam. Nat. 316.

—*Euphoria* COMMERS. (ex J. Gen. 248, part.).—*Scytalia* GERTN. Fruct. i. 197, t. 42.—*Dimocarpus* LOUR. Fl. Cochinch. 233, part. (incl.: *Cubilia* BL. Poppæa ECKL. et ZEYH. *Pometia* FORST. *Spanoghea* BL. *Stadmania* LAMK.).

<sup>4</sup> BL. Rumphia, iii. 173.—B. H. Gen. 406, n. 50.

<sup>5</sup> BL. Rumphia, iii. 100.—B. H. Gen. 400, n. 27.

<sup>6</sup> LAMK. Ill. t. 312.—POIR. Diet. vii. 376.—DC. Prodr. i. 615.—B. H. Gen. 406, n. 49. BAKER, Fl. Maurit. 59.

thick plano-convex, curved or sometimes convolute.—Trees or shrubs; leaves alternate pinnate or simple (*Pappara*<sup>1</sup>); folioles entire, dentate or serrate; the lowest sometimes smaller (*Pometia*)<sup>2</sup> suborbicular stipuliform; flowers in axillary and terminal subsimple or more or less ramified compound-cymiferous racemes.<sup>3</sup> (*Trop. reg. of Old World*.<sup>4</sup>)

8. **Podonephelium** H. BN.—Flowers polygamous-dicecious (nearly of *Nephelium*); calyx short cupular, shortly 5-dentate or sometimes subentire. Petals 0. Stamens 5–8 (in female flower 0 or few fertile or antherless) exserted below rudiment of gynæceum, interior to cupular crenulate ciliate disk; filaments finally exserted; anthers oblong introrse versatile, 2-rimose. Germen inserted at summit of thick cylindrical or subclavate erect podogynium, 3-lobed; cells 1-ovulate; style short, afterwards 3-fid; branches linear revolute, inwardly stigmatiferous to apex. Fruit 3-cocceous, placed at summit of podogynium; sterile cocci usually 2; fertile 1 (or more rarely 2, 3) subglobose, depressed at apex, longitudinally obtusely sulcate drupaceous; flesh scanty subcoriaceous; putamen thin; testa of ascendent subglobose seed, clothed with fleshy (ariloid) indumentum adhering at nearly every part except at 3-angular spathe round chalaza; cotyledons of thick exalbuminous embryo plano-convex fleshy superposed; radicle short arched conoid incumbent descendent.—A small tree; leaves alternate abruptly pinnate; folioles alternate from base very unequally falciform penniveined reticulate small veined; flowers in racemose composite cymiferous clusters axillary to upper leaves; pedicels articulate.<sup>5</sup> (*New Caledonia, Lifu*.<sup>6</sup>)

9. **Xerospermum** BL.<sup>7</sup>—Flowers polygamous-dicecious regular, 4-merous; sepals decussately imbricated; exterior smaller. Petals 4, alternate, short or very shortly subspathulate, rather villose at margin, esquamate. Stamens 8, short, interior to annular disk; filaments

<sup>1</sup> ECKL. et ZEYH. *Enum.* 53.—ENDL. *Gen.* n. 5635.—HOOK. *Icon.* t. 352.—B. H. *Gen.* 407, n. 51.

<sup>2</sup> FORST. *Prodr.* v. 74 (part.); *Char. Gen.* 109, t. 55.—B. H. *Gen.* 407, n. 52.—IRINA BL. *Bijdr.* 230.—CAMBESS. *Mém. Mus.* xviii. 24.—ENDL. *Gen.* n. 5607.—*Ecermanthus* THW. *Hook. Kew Journ.* vii. 272, t. 9.

<sup>3</sup> A genus allied to *Euphoria* by seed and fruit, differing principally in nature of calyx.

<sup>4</sup> Spec. ad 20. DC. *Prodr.* i. 611 (*Euphoria*).—WIGHT, *Icon.* t. 43.—BLANCO, *Fl. de Filip.* 287 (*Euphoria*).—HARV. et SONDR. *Fl. Cap.* i.

241 (*Sapindus*).—THW. *Enum. Pl. Zeyl.* 57, 408 (*Pometia*).—Miq. *Fl. Ind.-Bat.* i. p. ii. 553, 558 (*Pometia*), 569 (*Spanoghea*); *Suppl.* i. 508.—BENTH. *Fl. Austral.* i. 464.—WALP. *Rep.* i. 420; v. 364; *Ann.* ii. 220; vii. 630, 631 (*Spanoghea, Pappara*).

<sup>5</sup> A genus allied to *Sapindus*, and hence to *Nephelium*, principally distinct by cocci of fruit being stipate with elongated podogynium.

<sup>6</sup> Spec. 1. *P. stipitatum* H. BN. in *Adansonia*, xi. 245.—*Cupania stipitata* PANCH. herb.!

<sup>7</sup> *Rumphia*, iii. 99.—B. H. *Gen.* 405, n. 46.



free pubescent; anthers included small introrse. Germen (rudimentary in male flower) 2-dymous muricate; style rather thick short erect between lobes; stigmatiferous apex divided into 2 lobes unequal alternating with cells; ovule in cell solitary subbasilar; micropyle extrorse inferior. Fruit cocci 1, 2, sessile divergent, ellipsoid or obovate, thick coriaceous, outwardly pyramid-tuberculate, indehiscent, 1-spermous. Seed outwardly fleshy (arillate?) cotyledons of exalbuminous embryo large fleshy superposed; radicle curved acute.—A small tree; leaves alternate pinnate 3–5-foliolate; folioles subopposite petiolulate coriaceous entire; flowers<sup>1</sup> in axillary and terminal scantily ramified-cymiferous racemes. (*Ind. Arch.*<sup>2</sup>)

10. **Deinbollia** SCHUM. and THÖNN.<sup>3</sup>—Flowers regular (nearly of (*Sapindus*) polygamous-dioecious; sepals 5 unequal, much imbricated. Petals 5, alternate suborbicular concave, squamate or lanate-ciliate within, imbricated. Stamens  $\infty$  (usually 15–20) interior to disk,  $\infty$ -seriate; anthers linear oblong introrse included. Germen (in male flower rudimentary) 2–3-lobed to base; style erect between cells, straight or curved, long stigmatiferous to apex; ovules in cells 1, suberect; micropyle extrorse inferior. Fruit 1–3-lobed; lobes globose coriaceous. Seeds globose included in fleshy aril; cotyledons of exalbuminous embryo plano-convex thick unequal; radicle short incumbent.—Glabrous pubescent or villose trees; leaves alternate imparipinnate; folioles large, 2– $\infty$ -jugate glabrous; flowers<sup>4</sup> in axillary simple or composite ramified racemes. (*Trop. West. Africa.*<sup>5</sup>)

11. **Heterodendron** DESF.<sup>6</sup>—Flowers regular apetalous (nearly of *Nephelium*) hermaphrodite or polygamous; calyx short cupular unequally-crenate or lobate persistent. Discus short annular. Stamens 5–15, more or less interior to disk; filament hypogynous short; anthers erect introrse, 2-rimose, exerted. Germen central, 2–4-locular; style very short; apex obtuse 2–4-lobed stigmatiferous; ovules in cells 1, ascendent; micropyle extrorsely inferior, sometimes minutely obturated. Fruit dry, indehiscent; 2-dymous or 3–4-lobed, coriaceous; seed suberect arillate; cotyledons of exal-

<sup>1</sup> Small, "Greenish."

<sup>2</sup> Spec. 1, 2. MIA, *Fl. Ind.-Bat.* i. p. ii. 552.

<sup>3</sup> *Beskr.* 242.—ENDL. *Gen.* n. 5638<sup>1</sup>.—B. H. *Gen.* 405, n. 45.—*Prostea* CAMBESS. *Mém. Mus.* xviii. 25, t. 1 C.

<sup>4</sup> Globose, rather large.

<sup>5</sup> Spec. 5, 6. HOOK. *f. Niger*, 250.—BAKER,

*Fl. Trop. Afr.* i. 431.—WALP. *Rep.* v. 371; *Ann.* i. 134; ii. 224.

<sup>6</sup> *Mém. Mus.* iv. 8, t. 3.—DC. *Prodr.* ii. 92.—K. *Ann. Sc. Nat.* sér. 1, ii. 365.—ENDL. *Gen.* n. 5955 (*Connaraceæ* ?).—B. H. *Gen.* 407, 1000, n. 53.

buminous embryo thick flexuose; radicle short superior.—Glabrous or pubescent shrubs; leaves alternate or fasciculate, simple or pinnate, linear or oblong, thick coriaceous, entire or paucispinose; flowers<sup>1</sup> in axillary and terminal simple or 2-nate racemes; pedicels articulate at base.<sup>2</sup> (*Warm Australia*.<sup>3</sup>)

12. *Capura* BLANCO.<sup>4</sup>—Flowers polygamous regular; sepals 4, 5, equal, imbricated. Petals 4, 5, alternate, minute, articulate inflexed on both sides at margin, or more rarely 0. Stamens 5–10, interior to annular disk short; anthers introrse included. Germen (rudimentary in male flower) 3–4-locular; style very short, afterwards radiate–3–4-lobed stigmatiferous; ovule in cells 1, ascendent. Fruit 1–4-lobed<sup>5</sup> or oftener entire, 2–4-locular, coriaceous, indehiscent; seeds arillate; cotyledons of exalbuminous embryo thick fleshy, unequal obliquely superposed; radicle conical descendent.—Trees or shrubs; leaves alternate impari- or paripinnate; folioles sessile opposite or alternate, often pellucid-punctate; the lowest small stipuliform; rachis sometimes winged; flowers in terminal and axillary little or much ramified cymiferous racemes. (*Ind. Arch. Malasia*.<sup>6</sup>)

13. *Cupania* L.<sup>7</sup>—Flowers regular polygamous-dioecious; sepals 5 (or more rarely 3–6), free rather concave suborbiculate wide imbricated or oftener (*Matuyba*<sup>8</sup>) rather short, or short, less strictly

<sup>1</sup> Small insignificant.

<sup>2</sup> A genus whose flowers are not unlike the preceding, it differs principally in habit (*Olea*) and leaves often simple slightly evolute.

<sup>3</sup> Spec. 2, 3. F. MUELL. *Fl. Viet.* i. 90; *Fragm.* i. 46.—BENTH. *Fl. Austral.* i. 469.—WALP. *Ann.* vii. 631.

<sup>4</sup> *Fl. de Filip.* 234 (nec L.).—B. H. *Gen.* 405, n. 44.—*Otophora* BL. *Rumphia*, iii. 142.—*Otoplepis* TURCZ. *Bull. Mosc.* (1848), p. i. 512.

<sup>5</sup> In *Nephelio multijugo* HOOK. F. (*Trans. Linn. Soc.* xxiii. 164) which, according to authors, is a species of *Capura* with 3-lobed ovary.

<sup>6</sup> Spec. about 8. MIA. *Fl. Ind.-Bat.* i. p. ii. 559 (*Otophora*).—WALP. *Ann.* vii. 629.

<sup>7</sup> PLUM. *Gen. Amer.* 49, t. 19.—L. *Gen.* n. 279.—J. *Gen.* 249.—GÆRTN. *Fruct.* t. 177.—LAMK. *Diet.* ii. 225; *Suppl.* ii. 417.—DC. *Prodr.* i. 612.—CAMBESS. *Mém. Mus.* xviii. 28, t. 3.—SPACH, *Suit. à Buffon*, iii. 57.—ENDL. *Gen.* n. 5614.—B. H. *Gen.* 399, 999, n. 24.—BAKER, *Fl. Maurit.* 57.—*Trigonis* JACQ. *Stirp. Amer.* t. 102.—*Vouarava* AUBL. *Guian.* *Suppl.* 12, t. 374.—

*Blighia* KOEN. in *Ann. Bot.* ii. 571, t. 16, 17.—*Aakesia* TUSS. *Fl. Ant.* i. 66, t. 3.—*Guioa* CAV. *Icon.* 49, t. 373.—*Molinea* J. *Gen.* 245.—LAMK. *Ill.* t. 305.—*Dimerca* LABILL. *Sert. Austrocaled.* 51, t. 51.—*Diplopetalon* SPRENG. *Syst. Cur. Post.* 146.—*Digonocarpus* VELLOS. *Fl. Flum.* 152, iv. t. 14.—*Trigonocarpus* VELLOS. *loc. cit.* 153, t. 15.—*Dictyoncurea* BL. *Rumphia*, iii. 163.

<sup>8</sup> AUBL. *Guian.* i. 331, t. 128.—*Ephielis* SCHREB. *Gen.* 253.—*Gelonium* GÆRTN. *Fruct.* ii. 271, t. 139 (not ROXB.).—*Tina* ROEM. et SCH. *Syst. Veg.* v. 414 (not BL.).—? *Pediceilia* LOUR. *Fl. Cochinch.* (ed. 1790), 655.—*Ratonia* DC. *Prodr.* i. 618.—B. H. *Gen.* 399, 1000, n. 25.—*Mischocarpus* BL. *Bijdr.* 238; *Rumphia*, iii. 166.—*Lepidopetalum* BL. *Rumphia*, iii. 171.—*Arytera* BL. *Rumphia*, iii. 170.—*Lachnometalum* TURCZ. in *Bull. Mosc.* (1848), ii. 571.—*Zygolepis* TURCZ. *loc. cit.* ii. 573.—? *Paranephetium* TEYSM. & BINN. *Nat. Tijdschr. Ned.-Ind.* xxviii. 177.—MIA. *Fl. Ind.-Bat.* *Suppl.* i. 509 (*Mildea* MIA. *Ann. Mus. Lugd.-Bat.* iii. 88, t. 6).

imbricated or subvalvate. Petals equal in number to sepals (or 0), lined with scales or hairs, more rarely naked, imbricated. Stamens (sterile in female flower) 8 (or more rarely 5-7, or 9-12, interior to complete annular, entire or crenate, glabrous or pilose disk; filaments short, rather longer or much elongate-exserted; anthers introrse, 2-rimose. Germen central (rudimentary in male flower) often substipitate; style terminal, divided at apex into short stigmatiferous lobes or teeth equal in number to cells; cells in germen 3, more rarely 2 or 4; ovule in each 1, ascendent; micropyle extrorsely inferior. Capsule sessile or stipitate, obovate, obovate or 2-4-agonal, 2-4-lobed, sometimes coriaceous or subfleshy; lobes connate or subfree, divaricate or cymbiform, loculicidal or more rarely solute from axis, glabrous or sometimes setose within. Seeds suberect; testa coriaceous, glabrous, more or less highly arillate at base, sometimes more rarely naked; cotyledons of exalbuminous embryo thick fleshy, plano-convex straight or curved; radicle short incurved.—Trees or shrubs; leaves alternate, abruptly or imparipinnate; folioles (usually entire) alternate or opposite; flowers in subsimple or more or less (sometimes much) ramified compound-cymiferous racemes. (*All hot regions*.<sup>1</sup>)

14. **Erioccelum** Hook. JUN.<sup>2</sup>—Flowers polygamous-dioecious regular, 5-merous; sepals 5, valvate. Petals 0, or 5, alternate small, dilated within in scales sometimes subpeltate ciliate larger than limb. Disk annular duplex, outwardly 8-10-crenate; interior plate longer than exterior, enlarged inside with 8-10 radiant ribs. Stamens 8-10 interior to disk; filaments far exserted; anthers small, introrsely 2-rimose. Germen in male flower rudimentary central strigose-pilose. Female flower...? "Capsule coriaceous hispid, loculicidal 3-valved; cells inwardly lanuginous, 1-spermous."—Strigose trees; leaves alternate abruptly pinnate; folioles 2-4-jugate subopposite entire; flowers in axillary simple or ramified glomeruliferous racemes. (*Trop. West. Africa*.<sup>3</sup>)

<sup>1</sup> Spec. about 80. H. B. K. *Nov. Gen. et Spec.* v. 124.—A. S. H. *Fl. Bras. Mer.* i. 385, t. 79.—A. Rich. *Cub.* t. 31, 32 (*Ratonia*).—LABILL. *Sert.* t. 73.—GRISEB. *Fl. Brit. W.-Ind.* 125; *Cat. Pl. Cub.* 45.—Tr. et Pl. *Ann. Sc. Nat. sér. 4*, xviii. 373.—BL. *Rumphia*, iii. 157.—Miq. *Fl. Ind.-Bat.* i. p. ii. 586; Suppl. i. 509.—BENTH. *Fl. Austral.* i. 457, 460 (*Ratonia*).—BAKER, *Fl. Trop.*

*Afr.* i. 425, 426 (*Blighia*).—H. BN. *Adansonia*, xi. 246.—PANCH. & SEB. *Bois. N.-Caléd.* 230 (part.).—WALP. *Rep.* i. 418; ii. 815; v. 363; *Ann.* ii. 214; iv. 379 (part.); vii. 625, 627 (*Ratonia*).

<sup>2</sup> *Gen.* 400, n. 26.

<sup>3</sup> Spec. 2. BAKER, *Fl. Trop. Afr.* i. 427.

15. **Crossonephelis** H. BN.—Flowers monœcious regular apetalous; male sepals 4, rather thicker, scarcely connate at base, valvate. Stamens 4, opposite sepals and interior to cupular 4-lobed disk; disk lobes alternating with sepals: filaments inserted below small rudiment of gynæceum, arched subulate and at base more or less lodged in furrows of interposed disk lobes; anthers introrse ovate, 2-rimose. Female calyx valvate deeply 4-lobed. Disk thick cupular, finally strictly reflexed on calyx and representing a short fleshy gamopetalous corolla. Stamines 4, oppositisepalous, interior to disk rather thicker pointed. Germen free compressed-sub-2-dymous, 2-locular; style branches erect contiguous coadunate, divaricate at dilated oblong stigmatiferous apex. Ovules in cells solitary, ascendent from bottom of internal angle; micropyle extrorsely inferior. Fruit ...?—A glabrous tree; habit of *Sapindus*; leaves alternate crowded at summit of branches paripinnate; folioles subsessile opposite, 2-3-jugate penniveined glabrous; flowers small crowded in terminal spiciform scantily ramified cymiferous or glomeruliferous clusters; superior glomerules male; female inferior sometimes androgynous.<sup>1</sup> (*Nossi-be*.<sup>2</sup>)

16. **Talisia** AUBL.<sup>3</sup>—Flowers regular polygamous-diœcious; sepals 5, much (or sometimes scarcely) imbricate. Petals generally same in number alternate, imbricated, inwardly enlarged by entire or 2-lobed densely and rigidly barbate plates. Stamens 8 (or more rarely 5-7), interior to regular annular subentire or lobed disk; filaments free, usually glabrous; anthers introrse apiculate, 2-rimose. Germen (in male flower rudimentary) 3-lobed, 3-locular; ovule in cells 1, ascendent; micropyle extrorse inferior; style erect, apex stigmatiferous 3-lobed. Fruit ovoid acuminate dry, indehiscent, sometimes pubescent, 1-spermous; testa of exarillate ascendent seed sometimes rugose without; cotyledons of thick exalbuminous embryo fleshy hemispherical superposed; radicle short descendent accumbent.—Glabrous or pilose trees or small trees; leaves alternate abruptly pinnate; folioles entire coriaceous; flowers crowded in ramified cymiferous racemes. (*South-East trop. America*).

<sup>1</sup> A genus apparently allied to *Eriocaulon*, differing by apetalous 4-merous isostemonous, flowers cruciately 4-lobed disk sometimes by nature of 2-merous gynæceum.

<sup>2</sup> Spec. 1. *C. Pervillei* H. BN. *Adansonia*, xi. 245.

<sup>3</sup> *Güian*, i. 349, t. 136 (nec BENTH.).—LAMK. *III*, t. 310.—POIR. *Diet.* vii. 559; Suppl. v. 281,

—DC. *Prodr.* i. 609.—CAMBESS. *Mém. Mus.* xviii. 29.—ENDL. *Gen.* n. 5616.—B. H. *Gen.* 401, n. 31.—? *Aelodidia* R. et Pav. *Prodr.* 133, t. 29 (ex ENDL.).—*Comatoglossum* KARST. et Tr. in *Linnea*, xxviii. 436.

<sup>4</sup> Spec. ad 15. Tr. et Pl. in *Ann. Sc. Nat.* sér. 4, xviii. 369.—WALP. *Ann.* vii. 628.

17. **Lecaniodiscus** Pl.<sup>1</sup>.—Flowers polygamo-diœcious apetalous; lobes of sacciform gamophyllous calyx 5, subequal rotund, imbricated, finally reflexed. Disk shortly cupular adnate to perianth regular, obscurely 10-crenate sulcate within. Stamens 10, or more rarely 9; filaments hypogynously inserted interior to disk free slender far exserted; anthers basifixed elongated (effete in female flower?) introrse, 2-rimose. Germen free central sessile ovoid, 3-locular, attenuated to short style, reflexed at thickly 3-lobed stigmatiferous apex; ovules in cells 1, ascendent from internal angle; micropyle extrorsely inferior obturated. Fruit subdrupaceous ovoid, outwardly tomentose, acute at apex; mesocarp finally dry; putamen 1-spermous; seeds suberect, enclosed in copious basilar aril; testa crustaceous nitid; cotyledons of thick exalbuminous embryo conferminate.—A small tree; twigs and petioles pubescent; leaves alternate pinnate; folioles subopposite entire; flowers<sup>2</sup> in racemes simple or ramified at base. (*Trop. West Africa*.<sup>3</sup>)

18? **Jagera** Bl.<sup>4</sup>.—Flowers polygamous regular (nearly of *Cupania*) sepals 3-5, imbricated. Petals same in number alternate, enlarged inwardly with cucullate scales. Stamens 8, interior to annular disk, rather villose or pubescent. Germen turbinate 3-4-agonal, 3-4-locular; style short, stigmatiferous at apex, rather obtuse 3, 4-sulcate; ovule ascendent (of *Cupania*). “Fruit baccate hirsute; cells 3, 4, stupose at bottom, 1-spermous; seeds exarillate; embryo curved.”<sup>5</sup>—Trees; leaflets alternate, abruptly pinnate; leaflets serrate alternate and opposite; flowers in axillary and terminal ramified compound-cymiferous racemes. (*Trop. Asia, Oceania, Malacca*.<sup>6</sup>)

19 **Lepisanthes** Bl.<sup>7</sup>.—Flowers regular (nearly of *Cupania*). 4-5-merous; sepals and petals squamiferous within imbricated; scales cucullate or 2-lobed, sometimes furnished with 2-lobed or lacerate crest (*Scorodendron*<sup>8</sup>). Stamens 8-10, interior to complete annular disk; anthers included or exserted. Germen central, 2-3-locular. Fruit

<sup>1</sup> Hook. *Niger*, 251.—B. H. *Gen.* 403, n. 33.

<sup>2</sup> “Greenish purple, odorous.”

<sup>3</sup> Spec. 1 vel. 2. BAKER, *Fl. Trop. Afr.* 1, 428.

<sup>4</sup> *Rumphia*, iii, 155.—B. H. *Gen.* 403, n. 39.

<sup>5</sup> Other characters nearly of *Nephelium*. A very doubtful genus.

<sup>6</sup> Spec. 2, 3. RUMPH. *Herb. Amboin.* i. t. 53,

fig. 2.—ROXB. *Fl. Ind.* ii, 284 (*Sapindus*).—DC. *Prodr.* ii, 81, n. 2 (*Garuga*). DELESS.  *Ic. Sel.* iii, 35, t. 57 (*Gavuga*).

<sup>7</sup> *Bijdr.* 238; *Rumphia*, iii, 150 (part.)—CAMBESS. *Mém. Mus.* xviii, 25.—ENDL. *Gen.* n. 5609.—B. H. *Gen.* 403, n. 38.

<sup>8</sup> BL. *Rumphia*, iii, 149.—B. H. *Gen.* 403, n. 37.

entire, indehiscent drupaceous or coriaceous; cells 2, 3; seeds outwardly more or less pulpy; cotyledons of exalbuminous embryo thick more or less unequal and curved.—Trees or shrubs; leaves alternate pari- or imparipinnate; folioles opposite or subopposite entire; flowers<sup>1</sup> in axillary and terminal subsimple or ramified cymiferous racemes. (*Ind. Arch.*<sup>2</sup>)

20? **Anomosanthes** BL.<sup>3</sup> Flowers polygamo-dicecious regular (nearly of *Sapindus* or *Cupania*); sepals 5, imbricated. Petals 5, imbricated, furnished within with small scales. Stamens 8, rather short interior to thick annular glabrous disk, at first thinner or emarginate, thence thicker. Germen 3-locular; style short, stigmatiferous entire or 3-lobed at apex. Fruit 3-agonal, sub-entire or sub-3-lobed; seeds exarillate ascendent; cotyledons of thick exalbuminous embryo superposed unequal.—Glabrous or tomentose trees; leaves alternate imparipinnate; inflorescence of *Jagera* or *Lepisanthis*.<sup>4</sup> (*East. Cont. India, Ind. Arch.*<sup>5</sup>)

21. **Macphersonia** BL.<sup>6</sup>—Flowers polygamous regular; sepals 5 (coloured), much imbricated. Petals 5, alternate, small, very small (or 0) wide obovate-subspathulate unequally-lacerate unguiculate esquamate. Stamens 8, interior to crenate cupular disk; filaments in male flower inserted below rudiment of gynæceum, 2-plicate, in geniculate bud, finally subulate exserted; anthers introrse, 2-rimose. Germen (rudimentary in male flower) central substipitate, 3-locular; style short stigmatiferous 3-lobed at apex; ovule in cells solitary ascendent; micropyle extrorsely inferior. Fruit stipitate obliquely globular apiculate smooth, 1-3-locular; 2 cells effete. Seed ascendent; hilum wide scantily arillate; testa thick; embryo fleshy.—Very ramified small trees; leaves alternate crowded, 2-pinnate; rachis and petioles sometimes subulate; leaflets crowded opposite or alternate, entire or crenulate, oblique at base; flowers<sup>7</sup> in axillary more or less ramified compound-cymiferous racemes, articulate bracteolate. (*Malacca.*<sup>8</sup>)

<sup>1</sup> Usually whitish.

<sup>2</sup> Spec. about 4. DC. *Prodr.* i. 608, n. 18 (*Sapindus*).—Miq. *Fl. Ind.-Bat.* i. p. ii, 562. Gen. vix servandum.

<sup>3</sup> *Rumphia*, iii. 151.—B. H. *Gen.* 402, n. 36.

<sup>4</sup> A genus (probably when better known not

to be preserved) allied to preceding by regular perianth, by unequal disk tending to *Pancovia*.

<sup>5</sup> Spec. 2, 3. WIGHT et ARN. *Prodr.* i. 111.—WIGHT, *Ill.* 141.

<sup>6</sup> *Rumphia*, iii. 156.—B. H. *Gen.* 402, n. 34.

<sup>7</sup> Small, white.

<sup>8</sup> Spec. 2. H. BN. *Adansonia*, xi. 240.

22? **Glenniea** Hook. f.<sup>1</sup>—Flowers regular (nearly of *Nephelium*) polygamous; receptacle rather flat. Calyx gamophyllous, deeply 5-lobed, valvate. Petals 5, alternate, much shorter sub-3-angular shortly unguiculate wider than long rather thick ciliate. Stamens 8 (sterile in female flower); filaments short interior to disk; anthers introrse short, 2-dymous, 2-rimose. Germen 3-agonal, attenuated to shortly conical style; apex decurrent-3-lobed stigmatiferous; ovule in incomplete cells 1, suberect; micropyle extrorsely inferior. Fruit subglobose thickly fleshy obscurely lobed, 1-3-locular, 1-3-spermous; seeds smooth exarillate; embryo...?—A large tree; leaves alternate imparipinnate; folioles 1-2-jugate ovate-oblong; flowers<sup>2</sup> in simple or scantily ramified shortly cymiferous racemes terminal or oppositifolious. (*Zeylanica*.<sup>3</sup>)

23. **Schleichera** W.<sup>4</sup>—Flowers regular (nearly of *Nephelium*) polygamo-dicæcious apetalous; calyx small, 4-6-fid, subvalvate or slightly imbricate. Stamens 4-8, interior to regular disk; anthers short introrse. Germen (rudimentary in male flower) 3-4-locular; cells sometimes incomplete; style long conical, stigmatiferous revolute-3-4-lobed at apex. Ovules subbasilar; micropyle extrorsely inferior. Fruit ovoid dry; pericarp suberustaceous glabrous or here and there spinose; cells 1, 2, 1-spermous. Seed and aril of *Nephelium* (or *Euphoria*); cotyledons of exalbuminous conduplicate embryo unequal.—Trees; leaves alternate pari- or imparipinnate; folioles subopposite; flower in slender simple or ramified cymiferous racemes; pedicels slender.<sup>5</sup> (*Trop. Asia*.<sup>6</sup>)

24. **Melicocca** L.<sup>7</sup>—Flowers regular (nearly of *Schleichera* or *Nephelium*); sepals 4, 5, wider membranous, much imbricated. Petals 4, 5, alternate membranous esquamate, much imbricated.

<sup>1</sup> Gen. 404, n. 42.

<sup>2</sup> Small, pubescent.

<sup>3</sup> Spec. 1. *G. zeylanica* Hook. f.—*Sapindus unijugus* Thw. Enum. Pl. Zeyl. 56.—*S. Glenniei* Thw. loc. cit. (Gen. vix servandum.)

<sup>4</sup> Spec. Plant. iv. 1096.—Endl. Gen. n. 5621.—Bl. *Rumphia* iii. 147.—B. H. Gen. 404, n. 41.—Koon Gærtn. Fruct. ii. 486, t. 180.—*Cassambium* Rumph. Herb. Amboin. i. t. 57.

<sup>5</sup> A genus except for nonlobed fruit (a character it would seem of little importance here) scarcely distinct from *Nephelium*.

<sup>6</sup> Spec. 1 or 2. J. in *Mém. Mus.* iii. 187, t. 5 (*Melicocca*).—DC. *Prodr.* i. 615 (*Melicocca*).—DC. *Prodr.* i. 615 (*Melicocca* sect. *Spharococca*).—Miq. *Fl. Ind.-Bat. Suppl.* i. 199.—Thw. Enum. Pl. Zeyl. 58.—Walp. *Rep.* v. 366; *Ann.* ii. 222.

<sup>7</sup> Gen. n. 47.—J. Gen. 248; *Mém. Mus.* iii. (1817), 187 (part.) t. 4.—DC. *Prodr.* i. 615, sect. 1 (*Oococca*).—Spach, *Suit. à Buffon*, iii. 65.—Cambess. *Mém. Mus.* xviii. 32 (part.).—Endl. Gen. n. 5620.—B. H. Gen. 401, n. 32.—Casimiria Scop. *Introd.* n. 1026.

Stamens 8, interior to annular disk; filaments in male flower elongated; anthers extrorse, 2-rimose. Gynæceum of *Schleichera* 2-3-merous. Drupe subfleshy or dry; putamen crustaceous; cells 1, 2, 1-spermous. Seed suberect, outwardly pulpy; cotyledons of straight embryo thick.—Trees; leaves alternate paripinnate; folioles opposite sessile, 2-3-jugate; flowers in slender elongated simple or ramified clusters.<sup>1</sup> (*Central America*.<sup>2</sup>)

25. **Huertea** R. and PAV.<sup>3</sup>—Flowers polygamous (nearly of *Melicocca* or *Schleichera*); receptacle rather concave. Sepals 5, 6, and petals same in number alternate, imbricate. Stamens equal in number to alternate petals, slightly perigynous with perianth; filaments free alternating with as many small glands of disk; anthers introrse, 2-rimose. Germen free except at base; cells 2, incomplete from vanishing septum; ovule in each ascendent from inner angle; micropyle extrorsely inferior; style erect, acutely 2-fid stigmatiferous at apex. Fruit subdrupaceous, 1-spermous; seed...?—A tree; wood fulvescent; leaves alternate imparipinnate; folioles oblong-acute serrulate, at base sometimes unequally 2-glandular; flowers in axillary and terminal much compound ramified racemes.<sup>4</sup> (*Peru and Cuba*.<sup>5</sup>)

26. **Alectryon** GÆRTN.<sup>6</sup>—Flowers polygamo-diœcious apetalous; calyx lobes 4, 5, villous within, imbricated. Stamens 5-8 (in female flower effete or 0); filaments inserted between lobes of thick disk encircling them at base; anthers introrse, 2-rimose. Germen (rudimentary or 0 in male flower) 1-locular, unequally-obcordate, produced above sometimes to dorsal wing, sometimes to a small style, stigmatiferous at simple or shortly 2-3-lobed apex; ovule in cell 1, subbasilar ascendent; micropyle extrorsely inferior. Fruit turgid, woody or crustaceous, indehiscent or subtransversely unequally-broken; testa of ascendent subglobose seed crustaceous nitid, sur-

<sup>1</sup> A genus very nearly allied to *Schleichera*.

<sup>2</sup> Spec. about 2. JACQ. *Amer.* t. 72 (*Melicoccus*).—H. B. K. *Nov. Gen. et Spec.* v. 150.—TR. et PL. *Ann. Sc. Nat.* sér. 4, xviii. 377.—GRISEB. *Fl. Brit. W.-Ind.* 127.

<sup>3</sup> *Prodr.* 34, t. 6; *Fl. Per.* iii. 5, t. 227, fig. a.—DC. *Prodr.* ii. 90.—ENDL. *Gen.* n. 1134.—B. H. *Gen.* 428, n. 44.—MARCH. *Anacard.* 195.

<sup>4</sup> A genus hitherto doubtfully reckoned among the *Terebinthaceæ* (trib. *Spondias*) nearly

allied to the preceding, differing in the septum of the germen being incomplete.

<sup>5</sup> Spec. 1. *H. glandulosa* R. et PAV. *loc. cit.*—*H. Cubensis* GRISEB. *Cat. Pl. Cub.* 66.

<sup>6</sup> *Fruct.* i. 216, t. 46.—POIR. *Diet. Suppl.* i. 288.—DC. *Prodr.* i. 617.—CAMBESS. *Mém. Mus.* xviii. 37.—ENDL. *Gen.* n. 5627.—B. H. *Gen.* 410, n. 65.—H. BN. *Payer. Fam. Nat.* 319.—*Alectryon* A. CUNN. *Ann. Nat. Hist.* iii. 318.



rounded at base by very fleshy thick turgid<sup>1</sup> (red) unequally-rugose aril; cotyledons of exalbuminous curved embryo extremely spirally convolute; radicle inferior.—A lofty tree; leaves alternate imparipinnate; folioles entire or denticulate, pubescent beneath; flowers in axillary and terminal ramified compound cymiferous racemes. (*New Zealand*.<sup>2</sup>)

27? **Eriandrostachys** H. BN.—Flowers diœcious; male calyx 5-6-partite; folioles regularly arranged, very unequal and dissimilar from each other; the 2, 3, exterior shorter thick villose (like the sepals); the interior much larger wide petaloid;<sup>3</sup> all extremely imbricated. Stamens 8, interior to regular 5-crenate disk; filaments inserted below small central rudiment of gynœceum, in bud corrugate-plicate, finally exerted; anthers ovoid introrse, 2-rimose. Female flower...?—A tall small shrub; stems numerous; wood very hard; nearly all parts ferruginose-villose; leaves alternate paripinnate; folioles opposite, very short petiolulate, 6-10-jugate, unequally-lanceolate; flowers in axillary simple or scantily fasciculate rigid spikes subequal to leaves; the male in axils of short bracts glomerulate small.<sup>4</sup> (*Madagascar*.<sup>5</sup>)

28. **Thouinia** POIT.<sup>6</sup>—Flowers diœcious or polygamous regular; sepals 4, 5, free or connate at base, greatly or slightly imbricated. Petals 4, 5, alternate, sometimes minute (*Thinouia*<sup>7</sup>), entire or 2-lobed, furnished with villulose scales or 0. Stamens 8-10, interior to crenate or lobed annular disk; filaments free, oftener pilose; anthers introrse, 2-rimose. Germen (rudimentary in male flower) 3-locular; style erect, subentire or 3-fid stigmatiferous at apex; ovule in cell 1, ascendent; micropyle extrorsely inferior. Fruit 3-samaræ,<sup>8</sup> solute from central, sometimes persistent (*Thinouia*) axis; testa of exarillate seed membranous; cotyledons of exalbuminous embryo thick plano-

<sup>1</sup> The swelling finally bursting the pericarp by dehiscence.

<sup>2</sup> Spec. 1. *A. excelsum* GERTN. loc. cit.—Hook. Icon. t. 570.—Hook. F. Fl. N.-Zel. i. 37; Man. N.-Zel. Fl. 45.

<sup>3</sup> "Rosy."

<sup>4</sup> A genus, from the female flower being unknown, of very doubtful place in the order, whether allied to *Melicocco* (?); it differs chiefly in the spikes being very long and the leaves of perianth, although regularly arranged, being very unequal and dissimilar.

<sup>5</sup> Spec. 1. *E. Chapellieri* H. BN. *Adansonia*, xi. 239.

<sup>6</sup> Ann. Mus. iii. 70, t. 6, 7 (not DOMB. nor SM. nor SW.).—TURP. Dict. Sc. Nat. Atl. t. 171.—DC. Prodr. i. 612.—ENDL. Gen. n. 5618.—B. H. Gen. 400, 1000, n. 29.—*Thyana* HAM. Prodr. Fl. Ind. Occ. 36.—*Vargasia* BERT. Spreng. Syst. ii. 283.—*Carpodipterix* KARST. Fl. Columb. ii. 45, t. 23.

<sup>7</sup> TR. et PL. Ann. Scienc. Nat. sér. 4, xviii. 368. A genus at first sight sufficiently distinct, but better, according to BENTH. and HOOK. on account of the slight importance of these characters, not preserved.

<sup>8</sup> Resembling those of *Acer*.

convex or conferruminate; radicle incurved or nearly straight inferior.—Trees or shrubs sometimes scandent, cirrhous or ecirrhous; leaves alternate, pinnate or 3-foliolate (*Thinouia*), sometimes 1-foliolate; flowers in small cymes; cymes in compound or sometimes (*Thinoua*) short subcapitate racemes. (*Trop. America*.<sup>1</sup>)

29. **Atalaya** BL.<sup>2</sup>—Flowers regular polygamo-dioecious; sepals 5, unequal, imbricated. Petals alternate 5, at base within penicillate or furnished with scales. Stamens 8, 9, central, interior to complete annular disk; filaments free, equal or unequal erect; anthers oblong introrse, 2-rimose. Germen (in male flower rudimentary) central; style short, stigmatiferous 3-agonal at apex; ovule solitary in cells ascendent at middle of inner angle; micropyle extrorsely inferior. Fruit 3 samaræ, dry long winged at back, solute from axis indehiscent. Seed ascendent; testa coriaceous; cotyledons of exalbuminous embryo unequal thick plano-convex; radicle short inferior.—Glabrous trees or shrubs; leaves alternate pinnate; folioles  $\infty$ , or sometimes more rarely 1–3; petiole and rachis sometimes dilated-foliaceous; flowers<sup>3</sup> in ramified compound-cymiferous axillary and terminal racemes.<sup>4</sup> (*Trop. and subtrop. Oceania*.<sup>5</sup>)

30 ? **Ptæroxylon** ECKL. and ZEYH.<sup>6</sup>—Flowers polygamo-dioecious (nearly of *Melicocca* or *Atalaya*) regular; sepals 4, small and petals same in number, alternate longer, imbricated. Stamens 4 (effete in female flower) alternipetalous; filaments interior to 4-crenate disk; anthers introrse, 2-rimose. Germen (rudimentary in male flower) 2-locular; style branches 2-capitellate stigmatiferous at apex; ovules ascendent; micropyle extrorsely inferior. Capsule coriaceous samaroid compressed, obcordate, produced at apex to 2 thick rigid obtuse wings, loculicidally 2-valved, finally 4-partite. Seeds suberect, produced above to long vertical wing; albumen thin fleshy; cotyledons of curved embryo large compressed; radicle

<sup>1</sup> Spec. 10–12. H. B. Pl. *Æquin.* t. 56.—H. B. K. *Nov. Gen. et Spec.* v. 123.—A. S. H. *Fl. Bras. Mer.* ii. 384.—GRISEB. *Fl. Brit. W.-Ind.* 126; *Cat. Pl. Cub.* 46.—WALP. *Rep.* i. 420 (part.); v. 365; *An.* vii. 628.

<sup>2</sup> *Rumphia*, iii. 186.—B. H. *Gen.* 401 n. 30.

<sup>3</sup> Small or rather large, white.

<sup>4</sup> Flower nearly of *Triceros*; samaras nearly of *Thouinia*, *Pseudatalaya*, *Acer*, or some *Mal-*

*pighia*.

<sup>5</sup> Spec. about 5. DC. *Prodr.* i. 608, n. 13 (*Sapindus*).—DCNE. *Herb. Timor.* 115 (*Cupania*).—A. RICH. *Voy. Astrol. Bot.* 31, t. 12 (*Thouinia*).—BENTH. *Fl. Austral.* i. 462 (part.).—F. MUELL. *Fragm.* i. 46, 98 (*Thouinia*).—WALP. *Ann.* vii. 628.

<sup>6</sup> ECKL. et ZEYH. *Enum.* 54.—ENDL. *Gen.* n. 5636.—B. H. *Gen.* 411, n. 66.

arched accumbent ascendent.—A tree;<sup>1</sup> leaves approximately alternate or subopposite, crowded at summit of twigs, abruptly pinnate, folioles opposite oblique subtrapezoid obtuse or retuse, entire; flowers<sup>2</sup> in axillary ramified cymiferous racemes.<sup>3</sup> (*South Africa*.<sup>4</sup>)

**31. Melicopsidium** H. BN.—Flowers regular polygamous; sepals 5, unequal, much imbricated. Petals 5, alternate, longer orbiculate concave, glandular fimbriate at margin, imbricate. Stamens 5, alternipetalous, interior to regular disk outwardly between the petals prominent-5-angular; filaments hypogynous very corrugate-plicate, finally long exserted; anthers (effete in female flower) ovoid, introrsely 2-rimose. Germen (rudimentary in male flower) central, 3-4-locular; style terminal straight or slightly curved, simple stigmatiferous scarcely incrassate at apex; ovules in cells 2, inserted at middle of internal angle, oblique or subhorizontal. Fruit capsular, 3-4-cocceous; cocci solute from woody filiform-3-partite columella, inwardly dehiscens; endocarp subpergamaceous; exocarp finally dry thin-solubile. Seeds in cells 1, 2, globose-subhippocrepiform exarillate; testa crustaceous (dark); cotyledons of exalbuminous embryo amply foliaceous much convolute; radicle long terete arched.—A small tree; leaves alternate petiolate, 3-foliate; folioles oblong-lanceolate obtuse subcoriaceous; flowers in terminal corymbiform ramified-cymiferous racemes slightly shorter than upper leaves.<sup>5</sup> (*N.-Caledonia*.<sup>6</sup>)

**32. Harpullia** ROXB.<sup>1</sup>—Flowers regular diœcious or polygamous, 4- or more rarely (*Harpulliastrum*<sup>2</sup>) 5-merous; sepals equal and petals same in number alternate longer esquamate imbricated. Disk very small or 0. Stamens 5-8, hypogynous (in female flower rudimentary); filaments central erect elongated; anthers introrse. Germen (rudimentary in male flower) 2-3-locular; style short or elongate, straight

<sup>1</sup> Bark bitter.

<sup>2</sup> Small, ebracteate.

<sup>3</sup> "A genus approaching the *Simarubæ* in many points." (B. H.)

<sup>4</sup> Spec. 1. *P. utile* ECKL. & ZEYH. loc. cit.—HARV. *Thes. Cap.* i. 11, t. 17.—HARV. & SOND. *Fl. Cap.* i. 243.—WALP. *Rep.* i. 422; *Ann.* vii. 637.

<sup>5</sup> A genus not unlike *Harpullia*, differing chiefly in its 3-foliate leaves, petals, evolute disk, nature of capsule, exarillate seeds, very long radicle and convolute foliaceous cotyle-

dons. It presents apparently the regular form of *Cossigna* or *Loxodiscus*. Leaves of *Zanthoxylon*.

<sup>6</sup> Spec. 1. *M. trifoliatum* H. BN. *Adansonia*, xi. 243.

<sup>7</sup> *Fl. Ind.* i. 645.—B. H. *Gen.* 407, n. 54.—*Tina* BL. *Bijdr.* 235 (part.), not RÆM. et SCH.—*Ottonychium* BL. *Rumphia*, iii. 180.—*Blancoa* BL. loc. cit. 181.—*Danathophorus* ZIPP. *Bijdr. Nat. Wet.* v. 181 (*Thaumatophorus* ?).—*Streptostigma* THW. *Hook. Kew Journ.* vi. 298, t. 9 A.

<sup>8</sup> H. BN. *Adansonia*, xi. 242.

or contorted, obtuse or scarcely dilated stigmatiferous at apex; ovules in cell 2, oblique, inserted at middle of internal angle. Capsule<sup>1</sup> coriaceous inflated submembranous or sometimes ligneous (*Harpulliastrum*), 2-3-locular, loculicidal; seeds in cells 1, 2, arillate at base or to middle; aril adherent to testa (otherwise glabrous); cotyledons of thick exalbuminous embryo hemispherical or obliquely superposed fleshy; radicle short incumbent.—Trees; leaves alternate imparipinnate; folioles alternate glabrous; flowers<sup>2</sup> in more or less ramified compound-cymiferous racemes; pedicels often long, bracteolate at base. (*Trop. Asia and Oceania*.<sup>3</sup>)

33? **Hypelate** P. BR.<sup>4</sup> — Flowers polygamo-dioecious regular (nearly of *Thouineu* and *Pteroxylon*), 4-5-merous; petals esquamate imbricated or contorted. Stamens 8-10, interior to disk; anthers introrse cordate-ovate or subsagittate. Germen and 2 ovules (of *Hippobromus*). Fruit globose, dry, coriaceous or fleshy,<sup>5</sup> indehiscent; cells 1-3, 1-spermous. Testa of descendent seed coriaceous or crustaceous; radicle of exalbuminous embryo superior uncinate; cotyledons thick plano-convex.—Trees or shrubs; leaves alternate, pinnate or 3-foliolate, more rarely 1-foliolate; flowers in short compound-ramified sometimes corymbiform cymiferous racemes. (*Antilles, Florida*.<sup>6</sup>)

34. **Hippobromus** ECKL. and ZEYH.<sup>7</sup> — Flowers polygamo-dioecious regular (nearly of *Hypelate*), 5-merous; sepals unequal, imbricated, persistent. Petals 5, small esquamate thick or 0 (*Doratoxylon*<sup>8</sup>). Stamens 5-8, interior to complete annular disk hypogynous; anthers introrse oblong, 2-rimose. Germen (in male flower rudimentary or 0) 2-3-locular; style short, 2, 3-lobed stigmatiferous at apex; ovules in each cell 2, subcollaterally descendent; micropyle extrorsely superior. Fruit subglobose or ellipsoid coriaceous,

<sup>1</sup> Large, red or golden in *Blancoa* "surrounded by a membranous wing."

<sup>2</sup> Greenish, rather large.

<sup>3</sup> Spec. 6, 7. *Bl. Rumphia*, iii. 174.—Miq. *Fl. Ind.-Bat.* i. p. ii. 570; Suppl. i. 199.—BENTH. *Fl. Austral.* i. 470.—THW. *Enum. Pl. Zeyl.* 56.—WALP. *Ann.* vii. 631.

<sup>4</sup> *Hist. Jam.* 280.—POIR. *Dict. Suppl.* iii. 83.—CAMBESS. in *Mém. Mus.* xviii. 31.—SPACH. *Suit. à Buffon*, iii. 64.—ENDL. *Gen.* n. 5619.—B. H. *Gen.* 408, n. 55.—H. BN. *Payer Fam. Nat.* 316.—*Erotheu* MACF. *Fl. Jam.* i. 232. A genus with the following anomalous in the

order on account of the situation of the micropyle and only doubtfully placed here.

<sup>5</sup> Sometimes rather bluish.

<sup>6</sup> Spec. 2. *Sw. Fl. Ind. Occ.* ii. 653, t. 14.—DELESS. *Ik. Scd.* iii. 23, t. 39.—DC. *Prodr.* 615 (*Melicocce* sect. *Spharococca*).—J. *Mém. Mus.* iii. t. 5-7 (*Melicocce*).—HOOK. *Lond. Journ.* iii. 225, t. 7.—GRISEB. *Fl. Brit. W.-Ind.* i. 127; *Cat. Pl. Cub.* 46.

<sup>7</sup> *Enum.* 151 (1834-37).—ENDL. *Gen.* n. 5637.—B. H. *Gen.* 402, n. 35.

<sup>8</sup> DUP.-TH. MSS. (ex Boj. in *Herb. Hook. et B. H. Gen.* 408, n. 56).—BAKER, *Fl. Maurit.* 60.

indehiscent, 1-3-locular; seed in cell oftener 1, exarillate; cotyledons of fleshy exalbuminous embryo thick more or less curved or conduplicate; radicle short ascendent.—Small trees; twigs tomentellose (fulvous); leaves alternate, abruptly or imparipinnate; folioles subopposite entire or dentate; flowers in short much ramified cymiferous axillary and terminal racemes. (*South Africa and east. trop. islands.*<sup>1</sup>)

35? **Pseudopteris** H. BN.—Flowers 1-sexual regular; male calyx 5-partite (coloured), valvate or subimbricate. Petals 5, alternate much shorter, cucullate, induplicate-valvate; each enclosing in its cavity a small obtuse interior basilar glandule. Stamens 5, interior to glands and alternating with them; filaments free, exerted, inserted below small central rudiment of gynæceum; anthers ovate introrse (coloured), 2-rimose. Female flower...?—A small tree (not ramified or scarcely so) glabrous; leaves collected at apex alternate, very abruptly or paripinnate; folioles 20-25-jugate, opposite or alternate, unequally-trapezoid acute entire, sinuate or serrate reticulate-veined; male flowers in simple elongated racemes (springing from the wood) alternately cymiferous, small crowded, thinly pedicellate.<sup>2</sup> (*Madagascar.*<sup>3</sup>)

36? **Averrhoidium** H. BN.—Flowers polygamo-dicæious regular apetalous (nearly of *Hippobromus*); sepals 5, unequal, imbricated. Stamens 8, interior to regular lobed disk; filaments free; anthers short (effete in female flower). Germen in female flower central, 3-locular; style simple reclinate, stigmatiferous at apex; ovules in cells 2, inserted at middle of internal angle; one ascendent, the other descendent. Fruit...?—A tree; leaves alternate collected at summit of twigs, abruptly pinnate; leaves 2-4-jugate unequal, serrate above; flowers in short scanty cymiferous racemes terminal or axillary to upper leaves.<sup>4</sup> (*Brazil.*<sup>5</sup>)

37? **Filicium** THW.<sup>6</sup>—Flowers regular polygamous; sepals 5, im-

<sup>1</sup> Spec. 2, of which one is from Madagascar. *Porr. Suppl.* iii. 224 (*Melicocca*).—Juss. *Mém. Mus.* iii. 178, t. 7 (*Melicocca*).—DC. *Prodr.* i. 615, n. 5 (*Melicocca*).—THUNB. *Fl. Cap.* 268 (*Rhus*).—SPRENG. *Syst. Suppl.* 18 (*Weinmannia*).—HARV. & SOND. *Fl. Cap.* i. 241.

<sup>2</sup> A genus, from its female flowers being unknown, of very doubtful place, allied apparently to *Filicium* and *Hippobromus* (and perhaps to *Macphersonia*?).

Spec. 1. *P. decipiens* H. BN. *Adansonia*, xi.

243.

<sup>4</sup> A genus imperfectly known, allied in some respects to *Hippobromus* and *Melicocca* in others to *Dodonæa*.

<sup>5</sup> Spec. 1. *A. Gardnerianum* H. BN. *Adansonia*, xi. 244.

<sup>6</sup> *Enum. Pl. Zeyl.* 408 (*Burscreæ*).—B. H. *Gen.* 325, n. 11.—MARCH. *Adansonia*, viii. 43 (*Anacard.*).—*Pteridophyllum* THW. *Hook. Kew Journ.* vi. 65, t. 1 (not SIEB. et Zucc.).

bricated or subvalvate. Petals 5, alternate, esquamate, imbricate. Disk orbicular-cupular, interior to perianth, radiately-5-sulcate within. Stamens 5, alternipetalous, interior to disk; filaments inserted below gynæceum, lodged at base in grooves of disk; anthers introrse, 2-rimose. Germen (rudimentary in male flower) 2-locular; style short curved; apex laterally stigmatiferous, subentire or sub-2-lobed; ovule in cell 1, descendent or transverse, sometimes sub-ascendent. Drupe; putamen thin, 1-2-spermous; testa of oblong seed, membranous; cotyledons of exalbuminous curved embryo plicate-foliaceous; radicle ascendent.—A tree; twigs angular; leaves<sup>1</sup> alternate imparipinnate; rachis winged; folioles subopposite (5-8-jugate), articulate at base, crenate; flowers<sup>2</sup> in large ramified cymiferous racemes. (*East Ind.*<sup>3</sup>)

38. **Ganophyllum** BL.<sup>4</sup>—Flowers polygamo-dicæcious apetalous (nearly of *Filicium*); male calyx small cupular, 5-fid, valvate. Stamens 5-7, inserted between puberulose lobes of hypogynous disk; filaments free exserted; anthers oblong introrse. Germen rudimentary central. Female flower...?—A tree;<sup>5</sup> twigs angular and leaves alternate imparipinnate, lepidote with waxlike scales; folioles 8-jugate falcate entire coriaceous; flowers<sup>6</sup> in compound-ramified axillary racemes. (*Philippine Is. N.-Guinea, Australia* [?].<sup>7</sup>)

39. **Dodonæa** L.<sup>8</sup>—Flowers dicæcious or polygamous apetalous; sepals 2-5, sometimes minute, imbricated or valvate. Stamens 4-8 (or more rarely 9-12), central (rudimentary or 0 in female flower), inserted in non- or slightly-glandular receptacle; filaments free usually short; anthers introrse oblong, sub-4-agonal, 2-rimose. Germen (in male flower rudimentary or 0) surrounded at base by small disk enclosing the stamens when present outside or between the lobes,

<sup>1</sup> The younger ones with twigs and peduncle often covered with waxlike scales.

<sup>2</sup> Small, white.

<sup>3</sup> Spec. 1. *F. decipiens* THW. *loc. cit.*—*Pteridophyllum decipiens* THW.—*Rhus decipiens* WIGHT & ARN. *Prodr.* i. 172.—WIGHT, *Ill.* t. 75.

<sup>4</sup> *Mus. Lugd.-Bat.* i. 320.—B. H. *Gen.* 326, n. 12.—MARCH. *Adansonia*, viii. 37, 68 (*Bursera*.)

<sup>5</sup> "Balsamifera."

<sup>6</sup> Small, greenish, ebracteate.

<sup>7</sup> Spec. 1, 2. *Miq. Fl. Ind.-Bat.* i. p. ii. 655. *G. falcatum*, from the description most recently

known to us, F. MUELL. (*Fragm.* vii. 24) is *Bursera*, partly the same, as regards the fruit, as *Eucoschinus falcatus* BENTH. *Fl. Austral.* i. 490. The genus remains very doubtful.

<sup>8</sup> *Gen.* n. 855 (not PLUM.).—ADANS. *Fam. des Pl.* ii. 342.—J. *Gen.* 375.—LAMK. *Diet.* ii. 292; *Suppl.* ii. 494; *Ill.* t. 304.—DC. *Prodr.* i. 616.—CAMBESS. in *Mém. Mus.* xviii. 35.—SPACH, *Suit. à Buffon*, iii. 68.—ENDL. *Gen.* n. 5626.—A. GRAY, *Gen. Ill.* t. 182.—B. H. *Gen.* 410, n. 63.—H. BN. *Payer. Fam. Nat.* 319.—BAKER, *Fl. Mauriti.* 60.—*Empleurosmia* BARTL. *Pl. Preiss.* ii. 228.

3-6-agonal; cells 3-6; style erect, stigmatiferous 3-6-fid or dentate at apex. Ovules in cells 2, collateral or subsuperposed; one generally ascendent; the other descendent. Fruit capsular, membranous or subcoriaceous, 2-6-agonal or 2-6-winged, septically 2-6-valved; valves dorsally winged or carinate; columella persistently septiferous, seminiferous. Seeds compressed exarillate; funicle sometimes incrassate at apex; testa coriaceous or hard; cotyledons of exalbuminous embryo rather wide, more or less spirally-convolute.—Trees or shrubs, sometimes viscous; leaves alternate simple or more rarely paripinnate; flowers in axillary and terminal racemose-composite or corymbiform racemes (sometimes few or 1-flowered.) (*All hot reg.*<sup>1</sup>)

40. **Distichostemon** F. MUELL.<sup>2</sup>—Flowers polygamo-diœcious (nearly of *Dodonæa*) apetalous; sepals 5-8, linear-oblong, imbricated, finally not contiguous on both sides. Stamens  $\infty$ , central, free; filaments very short erect; anthers elongated basifixid hispid apiculate, introrsely 2-rimose; the interior sometimes imperfect. Germen (in male flower rudimentary or 0) surrounded by small disk; cells 2-4, 2-ovulate (of *Dodonæa*); style slender, simple or 2-4-dentate stigmatiferous at apex. Capsule 2-4-locular, septicidal; cells dorsally produced above in short coriaceous wings; valves 2-4, free from walls of 2-4-pterous columella, 1- or 2-spermous.—Whitish tomentose shrubs; leaves alternate sessile oblong entire reticulate-veined; flowers in terminal subsimple or slightly ramified racemes; pedicels short.<sup>3</sup> (*Trop. Australia.*<sup>4</sup>)

41 ? **Alvaradoa** LIEBM.<sup>5</sup>—Flowers regular diœcious; male calyx 5-lobed, valvate. Petals 5, alternating with sepals, filiform, capillaceous or 0. Stamens 5 (in female flower 0), oppositipetalous inserted between the 5 lobes of rather thick central disk; filaments long subulate exserted; anthers introrse; cells linear parallel, longi-

<sup>1</sup> Spec. about 50. RUDG. *Trans. Linn. Soc.* xi. t. 19, 20.—WIGHT, *Ill.* t. 52.—H. B. K. *Nov. Gen. et Spec.* v. 132, t. 442.—ANDR. in *Bot. Repos.* t. 230.—ENDL. *Atakt.* t. 31.—A. S. H. *Fl. Bras. Mer.* i. 392.—BL. *Rumphia*, iii. 188.—HOOK. *v. Fl. Nov.-Zel.* i. 38; *Man.* 44.—GRISEB. *Fl. Brit. W.-Ind.* 127.—HARV. et SOND. *Fl. Cap.* i. 241.—THW. *Enum. Pl. Zeyl.* 59.—BENTH. *Fl. Austral.* i. 472.—BOISS. *Fl. Or.* i. 953.—BAKER, *Fl. Trop. Afr.* i. 433.—TR. et PL. *Ann. Sc. Nat.* sér. 4, xviii. 378.—MONTROUZ. *Mém. Acad. Lyon.* x. 189.—*Bot. Mag.* t. 2860.—*Bot. Reg.* t. 442.—WALP. *Rep.* i. 421; v. 368;

*Ann.* i. 135; ii. 223; iv. 381; vii. 634.

<sup>2</sup> *Hook. Kew Journ.* ix. 306.—B. H. *Gen.* 410, n. 64.

<sup>3</sup> A genus nearly allied to *Dodonæa* with which it was long confounded, differing chiefly in habit and androecium.

<sup>4</sup> Spec. 1. *D. hispidulum*.—*D. phyllopterus* F. MUELL. *Hook. Kew Journ.* ix. 306.—BENTH. *Fl. Austral.* i. 487.—WALP. *Ann.* vii. 637.—*Dodonæa hispidula* ENDL. *Atakt.* t. 30.

<sup>5</sup> *Vidensk. Meddel. Kjöben.* (1853), 100.—B. H. *Gen.* 411, n. 67.

tudinally rimose; connective dorsal thick shortly subconical sub-basifixed. Sepals of female flowers 4, 5, free or subfree. Disk small 3-4-lobed. Germen elongate 2-3-locular; empty cells 1-2; the other 2-ovulate; ovules 2, inserted at base of septa (sometimes incomplete) ascendent; micropyle extrorsely inferior; styles 2, 3, unequal subulate recurved everywhere stigmatiferous. Fruit capsular much compressed subsamaroid elongated-2-3-winged, oblong elliptical or lanceolate; seeds compressed; cotyledons of exalbuminous embryo oblong rather flat; radicle short inferior.—Glabrous or incanopubescent (bitter) shrubs; leaves alternate imparipinnate; leaflets  $\infty$ , alternate entire, articulate, deciduous; flowers dense in axillary and terminal elongated racemes.<sup>1</sup> (*Mexico, Antilles*.<sup>2</sup>)

42? **Akania** HOOK F.<sup>3</sup>—“Flowers regular hermaphrodite; tube<sup>4</sup> of calyx hemispherical, lined within with disk; lobes 5, short, imbricate. Petals 5, inserted in faux, very shortly unguiculate rotundate, imbricate. Stamens 5-9, hypogynous; filaments short; anthers linear-elongate. Germen free pubescent narrow-ovoid indistinctly 3-gonal, 3-locular; style short, stigmatose at apex capitellate; ovules in cells 2, superposed, descendent. Fruit...?—A very glabrous tree”; leaves alternate imparipinnate; leaflets alternate petiolulate elongate-lanceolate acuminate spinoso-dentate coriaceous clear reticulate; “flowers<sup>5</sup> in axillary and externally-winged<sup>6</sup> freely branched pubescent panicles.”<sup>7</sup> (*Eastern Australia*.<sup>8</sup>)

43? **Llagunoa** R. and PAV.<sup>9</sup>—Flowers monœcious or polygamous apetalous subirregular; receptacle widely cupuliform unequal, lined within with a glandulous submembranous and irregular suboblique and crenate disk. Sepals 5, subequally 3-angular foliaceous, valvate or slightly imbricate. Stamens 8, interior to disk and inserted under

<sup>1</sup> A genus abnormal in the order, in some respects on account of its bitterness approaching the Quassian *Rutacæ*, in others *Terebinthaceæ* with the habit and leaves of the *Leguminosæ*.

<sup>2</sup> Spec. 2, 3. BENTH. *Pl. Hartweg.* n. 67 (*Mimos. Gen. Nov.* f.).—GRISEB. *Fl. Brit. W.-Ind.* 141; *Cat. Pl. Cub.* 50.—WALP. *Ann.* iv. 382; vii. 638.

<sup>3</sup> *Gen.* 409, n. 59.

<sup>4</sup> Receptacle concave?

<sup>5</sup> “Mediocribus, longe pedicellatis, ebrao-teatis.”

<sup>6</sup> “Pedales et ultra.”

<sup>7</sup> Belonging to this genus perhaps is (from B. H. *Gen.* 1000) *Apiocarpus*. MONTROUZ. *Mém. Acad. Lyon*, x. 190.

<sup>8</sup> Spec. 1. *A. Hillii* HOOK. F.—BENTH. *Fl. Austral.* i. 471.—*Cupania lucens* F. MUELL. *Fragm.* iii. 44.

<sup>9</sup> *Prodr.* 126, t. 28.—CAMBESS. *Mém. Mus.* xviii. 34.—ENDL. *Gen.* n. 5624.—B. H. *Gen.* 409, n. 58.—*Amirola* PERS. *Syn.* ii. 565.—DC. *Prodr.* i. 616.—*Orbignya* BERTER. *Merc. Chil.* 737, ex C. GAY (not MART.).



the germen, in female flower short; filaments free, in male flower far exserted and propending downwards through the space intermediate between the two anterior sepals unequal; anthers introrse (effete in female flower), 2-rimose. Germen (rudimentary in male flower) obliquely inserted at the bottom of the disk, 3-locular; style subulate; apex stigmatose scarcely or not dilated slightly curved; ovules in cell 2, oblique subsuperposed, covered with a small obturator. Fruit<sup>1</sup> capsular subglobose-3-gonal subpergameneous, with 3-valved cell; seeds in each cell 1, 2, oblique, minutely arillate; testa osseous nitid; cotyledons of exalbuminous spirally convoluted embryo foliaceous.—Trees or shrubs; leaves alternate, 1–3-foliolate; folioles serrate; flowers<sup>2</sup> axillary pedunculate solitary or racemose few. (*Western mountains of South America.*<sup>3</sup>)

44. **Xanthoceras** BGE.<sup>4</sup>—Flowers polygamous regular; sepals 5, equal, imbricate. Petals 5, alternate, unguiculate esquamate slightly membranous; in præfloration tortuous or imbricate, corrugate at apex. Disk slight, interior to petals, very shortly annular and before the sepals far produced to 5 elongated horns, recurved at apex and increased at base by short thick scale. Stamens 8, interior to disk, 4 of them alternipetalous, a little longer; filaments free; anthers introrse glandulose-apiculate, 2-rimose. Germen (in male flower rudimentary) central, 3-locular; style straight, stigmatose at apex, capitate-3-lobed; ovules in cell to 8, in two series superposed subtransverse; raphe subhorizontal interior. Capsule thick corticate, obovate-3-gonal obtuse, with 3-valved cell; valves in middle septiferous within. Seeds  $\infty$ , oftener few subglobose; testa glabrous (black); hilum broad; cotyledons of exalbuminous embryo thick.—Small trees; leaves alternate imparipinnate; folioles serrate; flowers<sup>5</sup> (appearing before the leaves) racemose; each rather long-pedicellated in axil of bract;<sup>6</sup> bracteoles 2, lateral, on longer or shorter pedicel. (*Northern China.*<sup>7</sup>)

<sup>1</sup> Rather large.

<sup>2</sup> Pale green.

<sup>3</sup> Spec. 3. H. B. K. *Nov. Gen. et Spec.* v. 130, t. 442.—HOOK. *Icon.* t. 132.—C. GAY, *Fl. Chil.* i. 369, t. 11.—TRI. et PL. *Ann. Sc. Nat.* sér. 4. xviii. 378.—WALP. *Rep.* i. 421.

<sup>4</sup> *Enum. Pl. Chin. Bor.* 11.—ENDL. *Gen.* n. 5629.—B. H. *Gen.* 408, n. 67.

<sup>5</sup> Rather large showy; petals white, at base within rosy purple.

<sup>6</sup> Racemes before anthesis involucrate within the wide bracts of the terminal bud.

<sup>7</sup> Spec. 1. X. *sorbifolia* BGE, *loc. cit.*—CARR. *Rev. Hort.* (1872), 291, tab.; (1873), 448, fig. 40.—WALP. *Rep.* i. 422.

## IV. PANCOVIEÆ.

45. **Pancovia** W.—Flowers irregular polygamo-dioecious; sepals 5, very unequal, imbricate; two exterior smaller. Petals 4 (the fifth place vacant), unequal, furnished above the claw with a cucullate scale often cristate-appendiculate at the back or apex, imbricate. Stamens 8, interior to unilateral or semilunar unequally lobed disk; filaments excentric unequal, often pilose; anthers shortly exserted, introrsely 2-rimose. Germen eccentric, often stipitate,<sup>1</sup> 3-lobed or 3-locular; style slender acute, apex stigmatose entire or obscurely 3-lobed; ovule in cell 1, ascendent; micropyle extrorsely inferior. Fruit 1–3-coccous to base; cocci 1, 2 sometimes abortive minute; the fertile ones oblong or subcylindrical, sometimes obovoid divaricate, 1-spermous. Seeds ascendent exarillate; testa membranous or crustaceous; cotyledons of exalbuminous embryo straight or areuate thick; radicle straight or more rarely curved incumbent.—Erect trees; leaves and inflorescence tomentose; leaves alternate exstipulate, and abruptly imparipinnate; leaflets alternate or subopposite; flowers in terminal ramose compound-cymiferous racemes. (*Tropical eastern and southern Asia, Indian Archipelago, tropical Australia, tropical western Africa.*) See p. 359.

46 ? **Chytranthus** Hook. f.<sup>1</sup>—Flowers hermaphrodite or polygamo-dioecious (nearly of *Pancovia*); calyx urceolate or shortly tubulose; lobes obliquely inserted unequal, slightly imbricate at margin. Petals 4, 5, unequal narrow, at base linear-attenuate obconico-concave; cavity furnished with a subulate slightly exserted process. Stamens 8, 9, interior to irregular disk. Germen and ovules of *Pancovia*; style incurved at apex 3-fid; lobes subulate stigmatose within more or less coadunate and tortuous. Capsule wide, 3-lobed nearly to axis; lobes more or less compressed; cells pilose within (tardily 2-valvate?). Seeds nearly of *Pancovia*; cotyledons of exalbuminous embryo conferruminate; radicle short inferior.—Small trees; leaves alternate pinnate; flowers<sup>2</sup> in fasciculate racemes oftener springing from the wood tomentose,<sup>3</sup> simple or sparingly ramose, alternately cymiferous; pedicels bracteate.<sup>4</sup> (*Tropical western Africa.*<sup>5</sup>)

<sup>1</sup> Gen. 403, n. 40.

<sup>2</sup> White, calyx and bracts reddish.

<sup>3</sup> The indumentum in one species (seen alive) somewhat purplish.

<sup>4</sup> A genus scarcely differing from *Pancovia*

except by its gamosepalous calyx, the form of its petals and its fruit.

<sup>5</sup> Spec. 2. BAKER. *Fl. Trop. Afr.* i. 429.—H. BN. *Adansonia*, xi, 241.

47. **Schmidelia** L.<sup>1</sup>—Flowers polygamo-dioecious, irregular, or subregular; sepals 4, decussate, imbricate; 2 exterior, smaller. Petals 4, alternate, often minute (sometimes 0), either glabrous, or villose-barbate within. Disk irregular or subregular, interior to petals, either continuous lobate, or consisting of glands 2, 4, oppositipetalous, rarely very small (or 0). Stamens generally 8, hypogynous, subcentric or often excentric free, oftener short; anthers introrse, 2-rimose. Germen excentric (in male flower rudimentary), 2-dymous or 2-3-lobed; cells 2, 3, 1-ovulate; style inserted between the lobes of the germen, stigmatose at apex variously 2-3-lobed; micropyle of ascendent subbasilar ovule extrorsely inferior. Fruit 1-3-coccous, dry, coriaceous or sometimes a little fleshy; embryo of seed shortly arillate at base exalbuminous curved; cotyledons 2-plicate.—Small trees or ecirrhose shrubs; leaves alternate exstipulate; leaflets 1-3 (or rarely 5), entire or serrate, sometimes punctate or lineate; flowers<sup>2</sup> in axillary simple or loosely ramose racemes, sometimes cymiferous. (*All tropical regions*.<sup>3</sup>)

48? **Hemigyrosa** BL.<sup>4</sup>—Flowers polygamous irregular (nearly of *Pancovia*); petals 4, 5; the fifth esquamate or 0. Stamens 8, disk 1-lateral, and the remaining characters those of *Pancovia*. Fruit spherical or 3-gonal, woody or coriaceous, indehiscent, externally tomentose or velutinous, hirsute within; cells 3, 1-spermous; embryo of exarillate seed exalbuminous; cotyledons fleshy equal.—Sericeo-pubescent trees; leaves alternate, abruptly or imparipinnate;<sup>5</sup> leaflets opposite petiolulate oblong; inflorescence,<sup>6</sup> etc. of *Pancovia*<sup>7</sup> (*Tropical Asia*.<sup>8</sup>)

<sup>1</sup> Mantiss. 67.—J. Gen. 247.—DC. Prodr. i. 610.—CAMBESS. Mém. Mus. xviii. 23.—SPACH, Suit. à Buffon, iii. 50.—ENDL. Gen. n. 5605.—BL. Rumphia, iii. 139.—B. H. Gen. 396, 999, n. 14.—Allophylus L. Gen. n. 476.—BL. Rumphia, iii. 121.—Aporetica FORST. Char. Gen. 131, t. 66.—Ornitrophe J. Gen. 247.—POIR. Dict. viii. 263; Suppl. v. 405.—LAMK. Ill. t. 309.—Gemella LOUR. Pl. Cochinch. (ed. 1790), 648.—Toxicodendron GÆRTN. Fruct. i. 207, t. 44 (not THUNB.).—Nassavia VELLOZ. Fl. Flum. iii. t. 155, 156.

<sup>2</sup> Small, often closed.

<sup>3</sup> Spec. ad 80. BURM. Fl. Int. t. 32, fig. 1 (Usbis).—H. B. K. Nov. Gen. et Spec. v. 121.—P. BEAUV. Fl. Ow. et Ben. t. 107.—A. S. H. Mém. Mus. xii. t. 13; Pl. Us. Bras. t. 67; Pl. Rem. Brés. 169, t. 19; Pl. Bras. Mer. i. 379, t. 82.—LABILL. Sert. Austro-caled. t. 52.—BOXB. Pl. Coromand. t. 61 (Ornitrophe).—WIGHT and ARN. Prodr. i. 109.—WIGHT Icon. t. 401, 964, 964<sup>2</sup>.

—PÆFF. and ENDL. Nov. Gen. et Spec. t. 244.—A. RICH. Fl. Abyss. Tent. t. 27; Cuba, t. 29, 30.—GUILL. and PERR. Fl. Sen. Tent. i. 120.—TURCZ. Bull. Mosc. (1858), i. 398.—GRISEB. Fl. Brit. W.-Ind. 126.—Miq. Fl. Ind.-Bat. i. p. ii. 574 (Allophylus), 576; Suppl. i. 199.—THW. Enum. Pl. Zeyl. 55.—HARV. and SOND. Fl. Cap. i. 238.—BAKER, Fl. Trop. Afr. i. 420.—KARST. Fl. Columb. t. 142.—TR. and PL. in Ann. Sc. Nat. sér. 4, xviii. 369.—BENTH. Fl. Austral. i. 451.—SEB. and PANCH. Bois. N.-Caléd. 229.—WALP. Rep. i. 414; ii. 814; v. 361; Ann. i. 133; ii. 208, 216 (Allophylus); iv. 378; vii. 621 (Schmidelia), 622 (Allophylum).

<sup>4</sup> Rumphia, iii. 165.—B. H. Gen. 395, n. 11.

<sup>5</sup> Pale.

<sup>6</sup> Generally hoary.

<sup>7</sup> To which genus, and also to *Anomosanthus* and to *Scorodendrum*, very near (see p. 380).

<sup>8</sup> Spec. about 3. PERS. Syn. i. 413 (Cupania).—

49 ? **Diploglottis** Hook. F.<sup>1</sup>—Flowers hermaphrodite (nearly of *Pancovia*); sepals 5, valvate. Petals 4, furnished above the claw with a scale 2-plicate glandulose-apiculate at the back. Capsule<sup>2</sup> globose-3-gonal, sub-3-lobate, with 3-valvate cell. Seed ascendent and enclosed by a pulpy<sup>3</sup> unequally fissured aril; testa thick;<sup>4</sup> cotyledons of (green) embryo thick-fleshy plano-convex.<sup>5</sup>—A tree; with ferrugineous-tomentose or subhirsute innovations; leaves alternate abruptly pinnate; leaflets opposite petiolulate; flowers crowded in axillary very composite-ramose cymiferous racemes, bracteate.<sup>6</sup> (*Subtropical Australia*.<sup>7</sup>)

50. **Paullinia** L.<sup>8</sup>—Flowers polygamo-diœcious irregular (nearly of *Pancovia* or *Schmidelia*), 5- or more nearly 4-merous; calyx imbricate. Petals 4, unequal, variously squamate-appendiculate. Stamens 8, or more rarely 9–15, interior to unequally-sometimes deeply-lobed disk; lobes of disk sometimes nearly free. The excentric germen and ovules of *Pancovia*; style 3-fid or 3-partite. Capsule pedicellate piriform, 3-gonal, sometimes 3-alate, more rarely exalate (*Enourea*<sup>9</sup>) and coriaceous, 1–3-locular, septicidally 3-valvate, 1–3-spermous. Testa of ascendent shortly arillate seed crustaceous; embryo exalbuminous straight or oftener curved.—Sarmentose scandent or volubile shrubs; leaves alternate, 1–3-ternate, pinnate or pinnately decomposite, oftener stipulate; petiole often winged; leaflets often dentate or crenate, punctate or lineolate; flowers in axillary, simple or ramose cymiferous racemes, very often 2-cirrrose at base. (*Tropical America*<sup>10</sup>)

51 ? **Castanella** Spruce.<sup>11</sup>—Flowers irregular polygamo-diœcious;

DC. *Prodr.* i. 613, n. 12 (*Cupania*).—Roxb. *Pl. Corom.* i. 43, t. 60 (*Molinaea*).—Thw. *Enum. Pl. Zeyl.* 56.—WALP. *Ann.* vii. 621.

<sup>1</sup> *Gen.* 395, n. 10.

<sup>2</sup> Ferrugineo-hirsute.

<sup>3</sup> Acid, turgid, smooth.

<sup>4</sup> Brown, smooth.

<sup>5</sup> Nearly as in *Esculus Hippocastanus*.

<sup>6</sup> Other characters of *Pancovia*, from which genus it is distinguished by its fruit and inflorescence. It seems hardly, however, to be retained.

<sup>7</sup> Spec. 1. *D. Cunninghami* Hook. f. loc. cit. —Benth. *Fl. Austral.* i. 454.—*Cupania Cunninghami* Hook. *Bot. Mag.* t. 4470.—WALP. *Ann.* ii. 215, n. 8.—*Stadmania Australis* A. Cunn. MSS. (Hook.).

<sup>8</sup> *Gen.* n. 331.—*J. Gen.* 247; in *Ann. Mus.* iv. 340, t. 66.—Poir. *Diet.* v. 95 (part.); Suppl. iv. 333.—LAMK. *Ill.* t. 318, fig. 2–5.—DC. *Prodr.* i. 604.—Cambess. *Mém. Mus.* xviii. 22.—SFRACH,

*Suit. à Buffon*, iii. 47.—ENDL. *Gen.* n. 5603.—H. Bn. *Payer Fam. Nat.* 316.—B. H. *Gen.* 394, n. 6. —*Semiarillaria* R. and Pav. *Prodr.* 54, t. 9.

<sup>9</sup> AUBL. *Guian.* i. 588, t. 235.—Cambess. *Mém. Mus.* xviii. 36.—ENDL. *Gen.* n. 5604.—B. H. *Gen.* 394, n. 8.

<sup>10</sup> Spec. ad 70. *PLUM. Gen.* 34, t. 35 (*Cururu*). —JACQ. *Obs.* t. 61, 62; *Hort. Schœnbr.* t. 268; *Jc. Rar.* t. 450.—SCHUM. *Act. Soc. Hafn.* iii. p. ii. 122, t. 11.—H. B. K. *Nor. Gen. et Spec.* v. 114. —A. S. H. *Pl. Rem. Brés.* 236, t. 23; *Pl. Bras. Mer.* i. 369, t. 77, 78.—DELESS.  *Ic. Sel.* iii. t. 37. —HOOK. *Erot. Fl.* t. 110.—PEFF. and ENDL. *Nor. Gen. et Spec.* t. 243.—TURCZ. *Bull. Mosc.* (1858), i. 397.—GRISEB. *Fl. Brit. W. Ind.* 123; *Cat. Pl. Cub.* 45.—Tr. and Pl. *Ann. Sc. Nat.* sér. 4, xviii. 350, 379 (*Enourea*).—WALP. *Rep.* i. 413; ii. 814; v. 360; *Ann.* iv. 377; vii. 620, 621 (*Enourea*).

<sup>11</sup> Ex B. H. *Gen.* 394, n. 7.—Tr. and Pl. *Ann. Sc. Nat.* sér. 4, xviii. 365.

sepals 4, decussate-imbricate; the two exterior minute; the interior much larger and widely concave. Petals 4, similar in pairs, lined within by a thick petaloid cristate squamule appendiculate at apex. Disk excentric dilated before the smaller petals into two large glands, Stamens 8, excentric; filaments more or less 2-adelphous at base; anthers introrse. Germen (in male flower rudimentary) excentric, 3-locular; style stigmatose at apex 3-fid; ovules solitary ascendent. Capsule subglobose, externally rough with stiff subulate spines, septicidally 3-valvate; seed (large) arillate exalbuminous.<sup>1</sup>—Scandent shrubs; leaves alternate, 1-3-foliolate; folioles entire cuspid reticulate glabrous; flowers in remotely cymiferous racemes. (*Tropical South America*.<sup>2</sup>)

52. **Valenzuelia** BERT.<sup>3</sup>—Flowers polygamous (nearly of *Paulinia*) slightly irregular; sepals 5, imbricate. Petals 5, or oftener 4, unequal, imbricate, lined within by a more or less developed squamule appendiculately 2-lobed or 2-fid at apex. Disk unequally 5-lobed irregular, sometimes hence duplex. Stamens 5-10, often 8, excentric; filaments free erect; anthers short, introrsely rimose. Germen (in male flowers rudimentary) 3-lobed, 3-locular; style stigmatose at apex 3-dentate; ovule in cells solitary ascendent; micropyle extrorsely inferior. Fruit capsular coriaceous, 1-3-lobed; cells loculicidal, 1-spermous; seed exarillate ascendent; cotyledons of exalbuminous curved embryo fleshy, unequally 2-plicate—Small erect glabrous trees; leaves opposite small entire, equal or at base unequal, coriaceous, 3-nerved, pellucidly punctulate; flowers axillary or more rarely terminal cymose corymbiform. (*Chilian Andes*.<sup>4</sup>)

53. **Bridgesia** BERT.<sup>5</sup>—Flowers diœcious (nearly of *Valenzuelia*) irregular; sepals 5, imbricate. Petals 4, longer, dissimilar in pairs, imbricate, furnished within with a large scale, incrassate-cristate at apex. Disk irregular, unequally 5-lobed. Stamens 8, interior to

<sup>1</sup> Cotyledons of thick embryo in recent doubtful species plano-convex conferruminate; radicle inflexed (nearly as in *Æsculus*).

<sup>2</sup> Spec. 1 or 2. WALP. *Ann.* vii. 621. A genus very similar, notwithstanding the external character of its fruit, to be referred to *Paullinia* (when better known).

<sup>3</sup> Ex CAMBESS. *Ann. Mus.* iii. 236, t. 14.—

ENDL. *Gen.* n. 5606.—B. H. *Gen.* 394, n. 9.—*Guindilia* GILL. *Hook. Bot. Misc.* iii. 170.

<sup>4</sup> Spec. 1. *V. trinervis* BERT. *loc. cit.*—C. GAY, *Fl. Chil.* i. 367.—*Guindilia trinervis* GILL. *loc. cit.*—WALL. *Rep.* i. 524.

<sup>5</sup> CAMBESS. *Nouv. Ann. Mus.* iii. 234, t. 13.—ENDL. *Gen.* n. 5602.—B. H. *Gen.* 393, n. 4.—*Tripterocarpus* MEISSN. *Gen.* 52; *Comm.* 37.

disk, excentric; filaments free; anthers introrse. Germen excentric, 3-locular; style slender, stigmatose 3-fid at apex; ovules in cells solitary ascendent from the base of the internal angle; micropyle extrorsely inferior. Capsule membranous, 3-gonal; cells inflated, produced upwards at the back to a vertical wing, finally free from axis and dehiscing longitudinally inwardly and at the apex; seed subglobose, exarillate; testa hard; cotyledons of exalbuminous curved embryo 2-plicate.—An erect glabrous shrub; leaves alternate coriaceous, entire or 3-lobed, dentate and inciso-serrate; flowers axillary pedunculate, solitary or 2 or few cymose. (*Chili*.<sup>1</sup>)

54. *Urvillea* H. B. K.<sup>2</sup>—Flowers irregular polygamo-dioecious (nearly of *Paullinia*); sepals 5, unequal, imbricate; the two exterior smaller. Petals 4, furnished with squamule within, imbricate. Stamens 8, interior to 1-lateral disk, unequally distended into lobes or disconnected glandules. Excentric germen and ovules of *Paullinia*; style short, stigmatose 3-fid at apex. Fruit 3 samaræ, to middle seminiferous membranous broad winged, indehiscent and finally free from short central columella. Seeds arillate at base; testa crustaceous; cotyledons of exalbuminous embryo thick.—Scandent or voluble shrubs, sometimes cirriferous; leaves alternate stipulate ternate; leaflets entire or dentate, sometimes punctate; flowers in axillary shortly cymiferous racemes 2-cirrose at base. (*Both Tropical Americas*.<sup>4</sup>)

55. *Serjania* PLUM.<sup>5</sup>—Flowers polygamous irregular (of *Urvillea*); fruit 3 samaræ, indehiscent, seminiferous at apex. Other characters of *Urvillea*.—Scandent or voluble shrubs; leaves alternate, 3-nate, 2-ternate or imparipinnate, often punctate; inflorescence of *Urvillea*. (*Tropical and Subtropical South America*.<sup>6</sup>)

<sup>1</sup> Spec. 1. *D. incisifolia* BERT. loc. cit. — C. GAY, *Fl. Chil.* i. 368.—WALP. *Rep.* v. 360 (*Rum-piata* Chilens).

<sup>2</sup> *Nov. Gen. et Spec.* v. 105, t. 440.—DC. *Prodr.* i. 602.—CAMBESS. *Ann. Mus.* xviii. 19.—SPACH. *Suit. à Buffon*, iii. 43.—ENDL. *Gen.* n. 5599.—B. H. *Gen.* 392, n. 1.

<sup>3</sup> White, articulate.

<sup>4</sup> Spec. about 10. A. S. H. *Pl. Rem. Brés.* t. 74; *Fl. Bras. Mer.* i. 352, t. 74.—GRISEB. *Fl. Brit. W.-Ind.* 122.—TR. et PL. in *Ann. Sc. Nat.* sér. 4, xviii. 344.—WALP. *Rep.* i. 511; v. 359; *Ann.* i. 132. iv. 376.

<sup>5</sup> *Gen.* 34, t. 35.—H. B. K. *Nov. Gen. et Spec.* v. 107, t. 441.—DC. *Prodr.* i. 602.—CAMBESS.

in *Mém. Mus.* xviii. 20.—SPACH. *Suit. à Buffon*, iii. 43.—ENDL. *Gen.* n. 5600.—B. H. *Gen.* 393, n. 2.—*Seriana* SCHUM. *Act. Soc. Hafn.* iii. p. ii. 126, t. 11.

<sup>6</sup> Spec. about 140. JACQ. *Hort. Schænbr.* t. 99 (*Paullinia*).—A. S. H. *Fl. Bras. Mer.* i. 355, t. 75, 76.—PÖPP. et ENDL. *Nov. Gen. et Spec.* t. 242.—TURCZ. in *Bull. Mosc.* (1858), i. 396.—GRISEB. *Fl. Brit. W.-Ind.* 123; *Cat. Pl. Cub.* 44.—TR. et PL. *Ann. Sc. Nat.* sér. 4, xviii. 345.—RADLKOF. *Conspect. Sect. Specierumque Gen. Serjanie* (1874). Monach. e Monogr. Gener. Seors. edit. (sect. 12).—WALP. *Rep.* i. 411; ii. 843; v. 359; *Ann.* iv. 376; vii. 619.

56. **Toulicia** AUBL.<sup>1</sup>—Flowers polygamo-diœcious irregular (nearly of *Serjania* or *Urvillia* or subregular; petals 5, furnished within with a 2-lobed or 2-fid long villose-barbate scale. Disk, gynœceum, etc., of *Serjania*. Fruit samaræ, membranous, indehiscent, free from central columella, seminiferous at apex; wings finally 2-partite; embryo of exalbuminous seed curved; cotyledons plicate. —Erect trees large or small; leaves alternate abruptly pinnate; leaflets opposite or subopposite entire or crenate; flowers in full very composite-ramose cymiferous glomeruligerous racemes. (*Tropical South America*.<sup>2</sup>)

57? **Pseudatalaza** H. BN.—Flowers polygamous irregular (nearly of *Diploglottis* or *Pancovia*); sepals 5, unequal, imbricate. Petals 4, unequal, furnished within above the claw with a cucullate cristate-2-appendiculate scale. Stamens 8, interior to 1-lateral thick disk; filaments free pilose; anthers introrse. Germen shortly stipitate obovate-3-lobed; lobes carinate-alate at back; ovule in cells 1, ascendent; micropyle extrorsely inferior; styles 5, coadunate within, separable, alternately contorted at apex stigmatose within. Fruit (of *Atalaya*); samaræ 3,<sup>3</sup> at back divaricate-alate, solute from axis, 1-spermous; embryo . . . ?—A shrub; leaves alternate pari- or imparipinnate; leaflets few- (1-3-) paired petiolulate coriaceous thick reticulately penninerved; flowers<sup>4</sup> in terminal full very ramose compound cymiferous bracteate racemes.<sup>5</sup> (*Australia*.<sup>6</sup>)

58. **Cardiospermum** L.<sup>7</sup>—Flowers polygamo-diœcious (of *Urvillea* or *Serjania*); sepals 5; 2 posticous, generally deeply connate. Petals 4, disk, stamens,<sup>8</sup> and gynœceum of *Urvillea*. Fruit capsular globosely 3-gonal, 3-locular inflato-membranous venose, loculicidal.

<sup>1</sup> *Guian.* i. 359, t. 140.—*J. Gen.* 248.—LAMK. *Ill.* t. 317.—DC. *Prodr.* i. 612.—CAMBESS. *Mém. Mus.* xviii. 22.—ENDL. *Gen.* n. 5601.—B. H. *Gen.* 393, n. 3. *Poncæ* SCHREB. *Gen.* 266.—*Dicranopetalum* PRESL. *Bot. Bem.* 24. (ex B. H.)

<sup>2</sup> Spec. 6, 7. WALP. *Rep.* i. 413; v. 360.

<sup>3</sup> Immature.

<sup>4</sup> Rather large; the inflorescence somewhat resembling that of the *Malpighiaceæ*.

<sup>5</sup> A genus constituting an irregular form of *Atalaya*, the fruit apparently the same, with the irregular flowers of *Pancovia*.

<sup>6</sup> Spec. 1. *P. multiflora*.—*Atalaya Australis*

F. MUELL. herb. 1.—? *A. multiflora* BENTH. *Fl. Austral.* i. 463, n. 2.

<sup>7</sup> *Gen.* n. 498.—*J. Gen.* 246.—LAMK. *Dict.* ii. 106; Suppl. ii. 350; *Ill.* t. 317.—GERTN. *Fruet.* i. 381, t. 79.—DC. *Prodr.* i. 601.—CAMBESS. *Mém. Mus.* xviii. 18, t. 1, fig. a, b.—SPACH, *Suit. à Buffon*, iii. 41.—ENDL. *Gen.* n. 5598.—PAYER, *Organog.* 154, t. 32.—B. H. *Gen.* 394, n. 5.—BAKER, *Fl. Maur.* 55.—*Corindum* T. *Inst.* 431, t. 246.—ADANS. *Fam. des Pl.* ii. 388 (*Corindum*).

<sup>8</sup> Pollen compressed-3-gonal; each angle furnished with a papilla. (H. MOHL. *Ann. Sc. Nat.* sér. 2, iii. 337.)

Seeds in cells 1, 2, globose; testa crustaceous, often shortly arillate at base; cotyledons of exalbuminous embryo large transversely conduplicate.—Herbs frutescent at base; branches slender abundant scandent sulcate; leaves alternate, 2-ternate or decomposite; leaflets crenate or serrate, sometimes pellucidly punctate or lineate; flowers in axillary sometimes corymbiform cymiferous racemes; peduncle naked at base, 2-cirrose; pedicels articulate. (*All tropical regions*.<sup>1</sup>)

59. **Kœlreuteria** LAXM.<sup>2</sup>—Flowers polygamous irregular; sepals 5, valvate. Petals 3, 4, alternate, unequal, unguiculate, furnished within with a small 2-partite scale. Stamens 5–8, interior to irregular 3, 4-lobed disk oblique among them; filaments free declinate, villose or glandulose; anthers introrse. Germen 3-locular; style stigmatose at apex subintegral or 3-fid; ovules in cell 2; one descendent; raphe dorsal; the other ascendent; raphe ventral. Fruit capsular inflated submembranaceo-vesicular venose, loculicidally 3-locular, at base and apex 1-locular; septa seminiferous within. Seeds subglobose exarillate; testa crustaceous (blackish); cotyledons of exalbuminous embryo spirally convolute.—A tree often small; leaves alternate imparipinnate; leaflets opposite and alternate membranous dentate; flowers<sup>3</sup> in full terminal ramosely cymiferous racemes. (*Northern China*.<sup>4</sup>)

60. **Stocksia** BENTH.<sup>5</sup>—Flowers irregular polygamo-diœcious; sepals 5, concave, glandulose at margin, imbricate. Petals 4, short unequal, villose within, glandulose at margins, imbricate. Stamens 7, 8, interior to unequal oblique tomentose disk; filaments villose at base; anthers oblong exerted introrse, versatile. Germen 3-quetrous; style incurved, stigmatiferous at apex simple acute; ovules in cell 2, subcollateral. Fruit . . . ?—A ramose rigid shrub;

<sup>1</sup> Spec. about 12, of which 3 are old world. H. B. K. *Nov. Gen. et Spec.* v. 99, t. 439.—A. S. II. *Fl. Bras. Mer.* i. 349, t. 73.—WALL. *Pl. As. Rar.* i. t. 14.—BENTH. *Sulph. Bot.* t. 6.—WIGHT. *Icon.* t. 508.—BL. *Rumphia*, iii. 183.—GRISEB. *Fl. Brit. W.-Ind.* 122.—BENTH. *Fl. Hongk.* 46; *Fl. Austral.* i. 453.—THW. *Enum. Pl. Zeyl.* 54.—BOISS. *Fl. Or.* i. 945.—TR. et PL. *Ann. Sc. Nat.* sér. 4, xviii. 343.—HARV. and SOND. *Fl. cap.* i. 237.—BAK. *Fl. Trop. Afr.* i. 417.—*Bot. Mag.* t. 1049.—WALP. *Rep.* i. 411; ii. 813; v. 358; *Ann.* i. 207; vii. 620.

<sup>2</sup> *Nov. Comm. Petrop.* xvi. 561, t. 18 (not HEDW. nor MURR.).—DC. *Prodr.* i. 616.—

CAMBESS. *Mém. Mus.* xviii. 33, t. i. fig. C.—SPACH, *Suit. à Buffon*, iii. 66.—ENDL. *Gen. n.* 5622.—PAYER, *Organog.* 155, t. 33.—AG. *Theor. Syst.* t. 29.—H. BN. *Payer Fam. Nat.* 318.—B. H. *Gen.* 396, n. 15.

<sup>3</sup> Yellow, showy.

<sup>4</sup> Spec. 1, often cultivated. *K. paniculata* LAXM. *loc. cit.*—DUHAM. *Aybr.* éd. nouv. t. 36.—BL. *Rumphia*, iii. 181.—*Bot. Reg.* iv. t. 330.—*K. paullinoides* LHER. *Sert.* 18, t. 19.—*Sapindus chinensis* L. FIL. *Suppl.* 228.

<sup>5</sup> *Hook. Kew Journ.* v. 304.—B. H. *Gen.* 397, n. 16.



twigs spinescent, leaves glaucescent alternate or fasciculate small linear entire; flowers <sup>1</sup> in axillary 1- or few-flowered fasciculiform bracteolate cymes (?). (*Beloochistan*.<sup>2</sup>)

61. **Diplopeltis** ENDL.<sup>3</sup>—Flowers polygamous irregular (nearly of *Kædreuteria*; sepals 5, subequal, glandulose-ciliate at margin, imbricate. Petals 4, membranous, unguiculate, esquamate, imbricate. Disk interior to perianth, very unequally oblique, dilated posteriorly to a compressed excentric cupule (presenting the appearance of 2 unequally crenate lamellæ). Stamens 8, subcentric (in female flower small effete); filaments free declined glabrous; anthers introrse versatile, 2-rimose. Germen (in male flower rudimentary) subcentric 2-3-lobed, 2-3-locular; style erect, afterwards contorted, at apex stigmatose scarcely or not dilated; ovules 2 in each cell, inserted in the internal angle, oblique or subtransverse. Fruit capsular coriaceous depressed 2, 3-lobed, septicidally 2-3-coecous; cocci finally dehiscing inwards, 1-2-spermous. Seeds oblique; testa crustaceous; aril small; cotyledons of exalbuminous embryo foliaceous very spirally convolute.—Herbs, oftener shrubby at base, glandulose pubescent; branches slender; leaves alternate simple unequally laciniately pinnatifid; flowers in terminal racemiform scorpioid bracteate cymes. (*South Australia*.<sup>5</sup>)

62. **Erythrophysa** E. MEY.<sup>6</sup>—Flowers hermaphrodite irregular (nearly of *Kædreuteria*); receptacle widely cupuliform. Sepals 5, inserted at margin, unequal, imbricate. Petals 4, unguiculate; limb thinly membranous subcorrugate venose; base furnished within with a very plicate-cristate scale. Disk large posterior widely cupular, crenate at glandulose undulate margin; androecium and gynæceum very or slightly excentric anterior to cupule. Stamens 8, subequal free, hypogynous; anthers short introrse. Germen stipitate, 3-locular; style simple, at apex stigmatose scarcely capitellate; ovules 2 in internal angle of cells; one ascendent; the other descendent. Fruit large inflated; cells 3, submembranous, winged at back,

<sup>1</sup> Small, globose.

<sup>2</sup> Spec. 1. *S. brahuica* BENTH. *loc. cit.*—BOISS. *Fl. Or.* i. 946.—WALP. *Ann.* iv. 374.

<sup>3</sup> *Hueg. Enum.* 42.—ENDL. *Gen.* n. 5625.—B. H. *Gen.* 396, n. 19.

<sup>4</sup> White, rosy or lilac, showy (somewhat resembling those of *Schizanthus*).

<sup>5</sup> Spec. 2. LEHM. *Pl. Preiss.* ii. 235.—MIQ. *Pl. Preiss.* i. 223.—F. MUELL. *Fragm.* iii. 12.—BENTH. *Fl. Austral.* i. 455.—*Bot. Reg.* (1139). t. 69.—WALP. *Rep.* v. 367.

<sup>6</sup> *Pl. Dreg.*—ENDL. *Suppl.* ii. 85.—B. H. *Gen.* 397, n. 18—*Erythrophysa* ARN. in *Hook. Journ. Bot.* iii. 258.

indehiscent (?). Seeds "compressed-globose exarillate."—Glabrous shrubs; leaves alternate fastigiate at the top of the branches imparipinnate; petiole winged; flowers<sup>2</sup> in more or less corymbose racemes<sup>3</sup>. (*South Africa, Malacascar.*<sup>4</sup>)

63. **Cossignia** COMMERS.<sup>5</sup>—Flowers polygamous irregular; sepals 5, subequal, imbricate. Petals 4, esquamate, imbricate, sometimes shorter than the calyx. Disk very irregular, excentric posticous. Stamens 5–8, anterior to disk hypogynous. Germen sessile, anterior to disk, 3-locular; style simple; apex stigmatose obtuse or subcapitate; ovules in cells 2, 3, finally oblique or sub-transverse. Capsule globose, 3-lobed, sometimes inflated submembranous (*Harpullipsis*<sup>6</sup>), loculicidal; valves oftener finally solute from axis. Seeds in cells 1–3, exarillate; testa crustaceous; cotyledons of exalbuminous embryo more or less convolute.—Shrubs sometimes cinereo-tomentose; leaves alternate imparipinnate; leaflets opposite entire; flowers in terminal often racemose-corymbiform cymiferous racemes.<sup>7</sup> (*Muscarene Islands, Malacassia.*<sup>8</sup>)

64? **Loxodiscus** Hook. f.<sup>9</sup> — Flowers polygamous irregular; sepals 5, unequal, very imbricate, at margin glandulose-fimbriate. Petals 5, unequal; the fifth often less than the others, or 4, shortly unguiculate, pilose, imbricate or contorted. Disk excentric posticous compressed-subcupular, higher at the back and unequally crenate. Stamens 7, 8, subcentric, anterior to disk; filaments free declinate; anthers oblong, introrsely 2-rimose. Germen as regards the stamens central (in male flower rudimentary) stipitate, 3-gonal; cells 3 (2 of which are posterior); style subulate, at apex stigmatose simple. Ovules in cells 2, inserted at the middle of the internal angle; one ascendent; micropyle extrorsely inferior; the other descendent; micropyle introrsely superior. Fruit capsular membranous, 3-gonal, loculicidally 3-valvate; seeds (immature) arillate at base.—A glabrous shrub; leaves alternate, exstipulate imparipinnate; petiole marginate

<sup>1</sup> "Testa purple."

<sup>2</sup> Red or white, appearing early.

<sup>3</sup> A genus by the character of its perianth and androecium recalling some *Cesalpinias*.

<sup>4</sup> Spec. 2. of which one has a very excentric gynaceum, viz. *E. undulata* E. Mex. loc. cit.—HARV. & SOND. *Fl. Cap.* i. 238.—WALP. *Rep.* i. 411 (*Erythrophila*); ANN. vii. 623. [Spec. alt. madagascar. H. BN. *Adansonia*, xi. 239.

<sup>5</sup> Ex. J. *Gen.* 248.—LAMK. *Dict.* ii. 132; *Ill.* t. 256.—DC. *Prodr.* i. 614.—GAMBESS

*Mém. Mus.* xviii. 33.—ENDL. *Gen.* n. 5623.—B. H. *Gen.* 397, n. 17.—BAKER, *Fl. Maurit.* 58.

<sup>6</sup> H. BN. *Adansonia*, xi. 248.

<sup>7</sup> A genus very near to *Erythrophysa*, having apparently the irregular form of *Harpullia*; fruit in a species from Madagascar inflatovesiculose.

<sup>8</sup> Spec. 2, 3.

<sup>9</sup> Hook. *Kew Journ.* ix. 200 t. 6.—B. H. *Gen* 398, n. 20.

subulate; leaflets opposite and alternate multijugous oblique obtusely serrate coriaceous; flowers<sup>1</sup> in terminal composite ("thyrsoid") very ramose cymes.<sup>2</sup> (*New Caledonia*.<sup>3</sup>)

65. **Ungnadia** ENDL.<sup>4</sup>.—Flowers irregular, polygamous; sepals 5, imbricate, oftener subequal. Petals 4, 5, unguiculate, imbricate; limb furnished within at base with cristate-lobate scale. Stamens 7-10; filaments subcentric free declinate, interior to 1-lateral oblique disk; anthers introrse (in female flower effete). Germen stipitate, 3-locular; style subulate, 3-sulcate, apex stigmatose simple; ovules in cell 2, inserted at middle of internal angle ascendent; micropyle extrorsely inferior.<sup>5</sup> Capsule stipitate coriaceous obpyramidally 3-gonal, style apiculate, loculicidally 3-valvate; seeds globose exarillate; hilum broad; cotyledons of exalbuminous embryo fleshy plano-convex conferruminate.—Small trees; leaves entire imparipinnate; leaflets serrate; flowers<sup>6</sup> (early) in loosely compound cymiferous racemes; pedicels articulate. (*Texas*.<sup>7</sup>)

66. **Magonia** A. S. H.<sup>8</sup>.—Flowers subregular polygamous, sepals 5, suboblique, imbricate. Petals 5, alternate esquamate elongate patent, imbricate. Disk complete evolute, very irregular, in some cases short annular subequally crenate granulato-glandulous, in others much more evolute much produced into 2 concentric lamellæ (the interior smaller). Stamens 8, interior to disk; filaments free, in male flower very long declinate, in female very short; anthers introrse, 2-rimose. Germen (in male flower rudimentary) ovoid, 3-locular; style curved, apex stigmatose obtusely 3-lobed; ovules (in male flower sterile very small)  $\infty$ , affixed in 2 series to internal angle subtransverse, finally imbricate in many series. Fruit capsular ligneous, globosely 3-gonal, loculicidal; valves solute from columella produced at base and apex to a septum; seeds  $\infty$ , ascendent compressed imbricate, produced at margin to a chartaceous wing; hilum

<sup>1</sup> Rather large open, lilac or rosy.

<sup>2</sup> A genus in some cases very near to *Kelreuteria*, in others to *Cossignia*.

<sup>3</sup> Spec. 1. *L. coriaceus* HOOK. F. *loc. cit.* — WALP. *Ann.* vii. 624.

<sup>4</sup> *Atakt.* t. 36; *Nov. Stirp. Dec.* 75, n. 86; *Gen.* n. 5640.—A. GRAY, *Gen. Ill.* 209, t. 178, 179.—B. H. *Gen.* 398, n. 22.

<sup>5</sup> Funicle thick rugose subfimbriate.

<sup>6</sup> Rosy, inserted in the axils of the inferior bracteiform leaves of a younger branch.

<sup>7</sup> Spec. 1. *U. speciosa* ENDL. *loc. cit.* — WALP. *Rep.* i. 423; v. 371.

<sup>8</sup> *Mém. Mus.* xii. 336, t. 12, 13; *Pl. Rem. Bres.* 238, t. 23, 24; *Fl. Bras. Mer.* i. 394 (not VELLOs.). CAMBESS. *Mém. Mus.* xviii. 35. — SPACH. *Suit à Buffon*, iii. 71.—ENDL. *Gen.* n. 5630.—*Phæocarpus* MART. et Zucc. *Nov. Gen. et Spec.* i. 61, t. 37, 38.

<sup>9</sup> Large thick; valves in the dry very hard, very concave within.

inwardly marginal; cotyledons of straight exalbuminous embryo broad transversely elliptical; radicle short conical interior.—Trees, bark suberose; leaves alternate, abruptly pinnate; leaflets entire emarginate; flowers in full laxly composite cymiferous racemes; pedicels slender. (*Brazil*<sup>1</sup>.)

## V. ÆSCULEÆ.

67. *Æsculus* L.—Flowers polygamous irregular; lobes of gamophyllous tubular calyx 5, unequal, imbricate. Petals 5, or, the fifth place vacant, 4, unequal unguiculate; claw linear, compressed or canaliculate; limb inappendiculate, imbricate. Stamens 5–8, subcentric; filaments free, interior to annular or 1-lateral disk subhypogynous, erect or arcuately declinate; anthers introrse, 2-rimose. Germen (in male flower rudimentary) subcentric sessile, 3-locular; style terminal elongate, apex stigmatose simple; ovules in cells 2, inserted in the internal angle; one ascendent; raphe ventral; the other descendent; raphe dorsal. Fruit capsular, 3-locular, smooth or more rarely echinate, coriaceous, globose or sub-3-lobed, loculicidal; cells 1–3, 1–2-spermous; seeds subglobose; hilum large; testa smooth coriaceous exarillate; cotyledons of exalbuminous embryo thickly fleshy hemispherical conferruminate; radicle arched more or less sheathed within the testa.—Trees or shrubs; leaves opposite exstipulate digitately composite; leaflets serrate; flowers in terminal more or less elongate branched cymiferous racemes; cymes often 1-parous. (*Temperate North America, temperate Asia, Malays*). See p. 367.

68? *Billia* PEYR.—Flowers polygamous (nearly of *Æsculus*); sepals 5, sub-free, approximating to a tube, imbricate. Petals 4, 5, unguiculate, incrassate within to base of limb esquamate or appendiculate with 2-lobed scale. Disk excentric, 1-lateral.—Trees; leaves opposite exstipulate digitately composite, oftener 3-foliolate; inflorescence, etc., of *Æsculus*. (*Mexico, Columbia*). See p. 369.

<sup>1</sup> Spec. 2. WALP. Rep. i. 422.

## VI. MELIANTHEÆ.

69. **Melanthus** T.—Flowers hermaphrodite irregular; receptacle very unequally concave, posteriorly produced to a spur. Sepals 5, very unequal; the posterior least of all, inserted far from the rest; præfloration imbricate. Petals 5 or 4 (the anterior 1, small or deficient), subperigynously inserted at margin of receptacle, long-clawed narrow rather fleshy and oftener tomentose, near anthesis not contiguous. Stamens 4 (the fifth posterior deficient), 2-dynamous; filaments interior to disk lining the cavity of the receptacle and posteriorly produced to a 2-plicate crest, declinate; 2 anterior, finally shorter; the posterior sometimes connate at base by means of a transverse band; anthers introrse, 2-rimose. Germen oblong, 4-lobed; cells 4, of which 2 are lateral; style central incurved, stigmatose at apex, shortly 4-dentate. Ovules in each cell 2-4, inserted in 2 series in the internal angle ascendent; micropyle extrorsely inferior. Capsule papyraceous, 4-lobed; cells 4, by abortion 1-spermous, dehiscing inwardly at apex; seeds subglobose exarillate; testa nitid crustaceous; albumen copious fleshy or horny; cotyledons of small (green) embryo ovately linear; radicle obtuse incrassate at apex.—Glabrous shrubs, glaucous or canescent (strong scented); leaves alternate imparipinnate; leaflets decurrent unequilateral dentate; stipules lateral or intra-axillary, free (*Diplerisma*) or connate; flowers in axillary or terminal racemes, bracteate; pedicels short bracteolate. (*South Africa*.) See p. 369.

70. **Bersama** FRESEN.<sup>1</sup>—Flowers irregular hermaphrodite or polygamo-diœcious; sepals 5, unequal; the 3 superior subfree or connate at base, imbricate; the 2 anterior much more or nearly quite connate,<sup>2</sup> valvate. Petals 5, alternate, imbricate, subequal or unequal<sup>3</sup>; the anterior larger; claws bare or incrassately glandulose within to apex. Stamens 4, 5, alternipetalous, interior to semilunar posterior or sub-complete disk; filaments all (*Eubersama*<sup>4</sup>) at base 1-adelphous, or the anterior only (*Natalia*<sup>5</sup>) connate; anthers introrse,

<sup>1</sup> *Mus. Senkenb.* ii. 280, t. 17.—ENDL. *Gen. n.* 4572 (*Ampelid. Dub.*).—B. H. *Gen.* 412, n. 70.

<sup>2</sup> "Lacinia antica apice 2-fida" (ENDL.).

<sup>3</sup> Thick, sericeous, white.

<sup>4</sup> *Bersama* PL. *Trans. Linn. Soc.* xx. 417, t. 20,

fig. 24-28.

<sup>5</sup> HOCHST. *Flora* (1841), 663.—PL. *loc. cit.* fig. 21-23; *Hook. Icon.* t. 780.—*Rhaganus* E. MEY. *Herb. Drège*.

2-rimose. Germen subcentric, 4-5-locular; cells oppositipetalous, 1-ovulate; style elongate curved, at apex stigmatose more or less obpyramidal; micropyle of ascendent sub-basilar ovule extrorsely inferior.<sup>1</sup> Capsule coriaceous or ligneous, loculicidally 4-5-valvate; valves in the middle septiferous within; embryo albuminous straight; radicle inferior. Seeds arillate.—Trees or shrubs; leaves alternate imparipinnate; leaflets entire or serrulate; stipules intra-petiolate 2-nate, connate at base; flowers in simple terminal or lateral racemes. (*Tropical and Southern Africa*.<sup>2</sup>)

71. **Greyia** HOOK. and HARV.<sup>3</sup>—Flowers hermaphrodite; sepals 5, orbiculate, imbricate persistent. Petals 5, perigynous, imbricate, deciduous. Disk cupular crowned with 10 staminodes glanduliferous at apex. Stamens 10, inserted within the disk; filaments filiform subdeclinate far exerted; anthers ovate, 2-dymous. Germen oblong deeply 5-sulcate, from the placentiferous introflexed margins of the carpels semi-5-locular, attenuated to a slender style slightly stigmatose at apex; ovules  $\infty$ , 2-seriate in parietal placentas. Capsule membranous, septicidally folliculately 5-partite. Seeds  $\infty$ , minute; testa membranous; embryo at base of fleshy albumen minute.”—Small trees; wood soft; leaves<sup>4</sup> alternate petiolate exstipulate cordately subtrifid duplicately crenate or sublobate glabrous glandulose; “flowers<sup>5</sup> in dense axillary racemes.” (*South Africa*.<sup>6</sup>)

## VII? AITONIEÆ.

72. **Aitonia** L. f.—Flowers hermaphrodite regular, 4-merous; sepals connate at base, imbricate, deciduous. Petals 4, alternate, much longer; in præfloration imbricate or oftener tortuous. Stamens 8, inserted under small crenate disk; filaments at base 1-adelphous connate in a tube, afterwards free exerted filiformly subulate; anthers oblong introrse, 2-rimose. Germen free, sub-4-lobate; style

<sup>1</sup> Funicle short erect, sometimes (at least in 1 species) more or less dilated, hence closing the micropyle.

<sup>2</sup> Spec. 4. A. RICH. *Fl. Abyss. Tent.* i. 107, t. 26.—PL. *Niger*, 252, t. 29 (*Natalia*).—HARV. and SOND. *Fl. Cap.* i. 369 (*Natalia*).—BAKER, *Fl. Trop. Afr.* i. 433.

<sup>3</sup> *Proc. Dubl. Univ. Zool. and Bot. Ass.* i. 138, t. 13, 14.

<sup>4</sup> Somewhat recalling those of *Francoa*.

<sup>5</sup> Scarlet showy.

<sup>6</sup> Spec. 1. *G. Sutherlandi* HOOK. and HARV. —HARV. *Thes. Cop.* t. 1; *Fl. Cap.* ii. 308.—WALP. *Ann.* vii. 911 (*Saxifrag.*).

slender exserted, stigmatose at apex simple not dilated; cells 4, alternipetalous; ovules in each 2, collaterally descendent, incompletely anatropous; micropyle extrorsely superior. Fruit capsular membranous venose, inflated 4-lobed, shortly 4-winged, loculicidally 4-valvate; valves septiferous. Seeds in cells 1, 2, subreniform; testa coriaceous corrugate; cotyledons of exalbuminous or scarcely albuminous embryo foliaceous oblong; radicle short straight superior.—A rigid ramose shrub; leaves on short twigs alternate or fasciculate, simple entire linear-oblong subcoriaceous, scarcely petiolate exstipulate; flowers axillary solitary or few pedunculate. (*South Africa.*) See p. 371.

### VIII. ACEREÆ.

73. **Acer** T.—Flowers hermaphrodite or oftener polygamo-dicous; calyx 4–12-, oftener 5-partite or fid, imbricate, generally deciduous. Petals same in number alternate, imbricate, or 0. Stamens equal to number of alternate petals; filaments free variously inserted more or less within or without an annular lobate thick or thin, sometimes obsolete disk, filiform or sometimes capillary; anthers introrse, sometimes linear, 2-rimose. Germen central, 2-lobed, 2-locular (or more rarely 3-merous), contrarywise compressed to septum (in male flower rudimentary, effete or 0); style inserted between lobes of germen, divided at base or more or less above into 2 (or 3) linear branches, far stigmatose within and to the apex. Ovules in cells 2, collaterally or subsuperposed ascendent; micropyle finally extrorsely inferior; placenta dilated around hilum in a broad (arilloid) process. Fruit 2 (more rarely 3) samaræ, divaricate, indehiscent, produced externally above to elongate obliquely dilated coriaceous or membranous reticulately nerved wings. Seeds ascendent compressed; testa membranous, arillate to hilum; endopleura fleshy or mucous; cotyledons of conduplicate embryo thin irregularly plicate; radicle rather longer inferior.—Large or small trees; juice aqueous, saccharine, or milky; leaves opposite petiolate exstipulate, simple, entire, palmately or subpedately 3–7-lobed, sometimes (*Negundo*) pinnately 3–5-foliolate; flowers in axillary or terminal compound cymiferous racemes or corymbs.—*Temperate Europe, Asia, and North America, Java.*) See p. 373.

74. *Dobinea* HAM.<sup>1</sup>—Flowers diœcious; male calyx saccate, 4-dentate at apex, valvate. Petals 4, attenuate at base, inserted under the rudiment of the gynœceum, imbricate. Stamens 8, inserted in 2-series with the petals; 4 opposite the petals, shorter; filaments free; anthers introrse, sub-2-dymous, 2-rimose. Female flowers without perianth; gynœceum sessile in axil of bract; germen 1-locular, surrounded at base by unequal disk, posteriorly more developed; style apical slender, spirally involute to apex and stigmatose within; ovule descendent from internal angle of the germen; micropyle introrsely superior. Fruit dry compressed, unequally orbiculate, girt with membranous aliform margin, indehiscent; seed 1, descendent; testa membranous; cotyledons of exalbuminous curved embryo elliptical rather thick; radicle accumbent.—A shrub; branches virgate; leaves opposite petiolate ovately lanceolate serrate penninerved reticulate; flowers crowded in terminal nutant very composite ramose cymiferous racemes; each female supported by a (coloured) anterior adnate bract, fructiferous very accrete dilated subfoliiform (samaroid) membranous costate reticulately venose.<sup>2</sup>—(*Mountainous India*.<sup>3</sup>

1 *Don, Prodr. Fl. Nepal.* 249.—*ENDL. Gen. n.* 5560.—*B. H. Gen.* 410, n. 62.

2 A genus of very doubtful place.

3 *Spec. 1. D. oppositifolia* Don, *loc. cit.*



## XLIV. MALPIGHIACEÆ.

### 1. MALPIGHIA SERIES.

We shall study first in this series not the *Malpighia*, which have given the name to it, as well as to the entire family, but a type distinguished by the independence of its carpels, as well as of the parts of all its floral verticels. This may be, for example, a *Pterandra*<sup>1</sup> (fig. 427, 428), whose flowers are hermaphrodite, regular and pen-

*Pterandra pyroidea*.

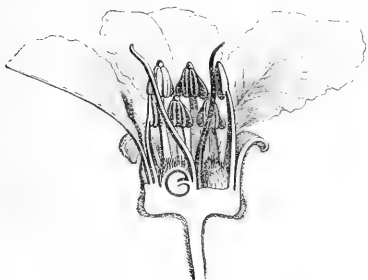


Fig. 427. Longitudinal section of flower ( $\frac{1}{2}$ )

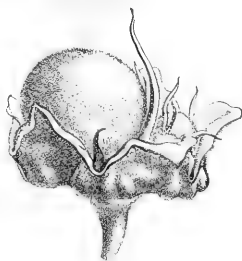


Fig. 428. Fruit ( $\frac{1}{2}$ ).

tamerous. Their receptacle surbased, and in form of a patulous cupula, supports five sepals quincuncially imbricate. On the exterior face two lateral glands are generally seen, here but slightly developed, sometimes even hardly visible, but having, in many other genera of this family, a very large development. The five petals, alternate with the sepals, are provided with a short claw and a large membranous imbricate limb. The androceum is composed of two

<sup>1</sup> A. Juss. in *A. S. H. Fl. Bras. Mer.* iii. 72 (part.); *Monogr. des Malpighiacées* (1843), 62, t. 6.—ENDL. *Gen.* n. 5589.—GRISEB. *Linnaea*,

xiii. 288.—B. H. *Gen.* 253, n. 9.—*Ecphymacalyx* POHL. in *Flora* (1825), 183 (ex ENDL.).

verticels of stamens, five of which are alternipetalous and longer; each formed of a free filament and an introrse anther whose two cells are dilated outwardly in a sort of wing and open by a longitudinal slit. The gynæceum is composed of three independent carpels, collocated round the centre of the receptacle, each being formed by a unilocular ovary and a subulate style, stigmatiferous towards its tapering summit, and whose base is inserted, according to age, more or less low on the internal edge of the ovary. This latter contains in its internal angle an ovule, transversely or more or less obliquely directed, incompletely campylotropous, the micropyle being at first turned upwards and outwards, but frequently displaced later on. The fruit is formed of three achenes, one or two may be arrested in their development (fig. 428). Their coat is thick, woody, and each of them is supported by a short foot. Those which are fertile contain a globular seed whose membranous coats cover an embryo with short superior radicle and thin cotyledons, irregularly convolute, the inner being usually longer and folded many times upon itself. Only one species of *Pterandra*<sup>1</sup> is known; it is a Brazilian shrub, all of whose parts are covered with a silky down. The leaves are opposite, entire, nearly coriaceous, nearly glabrous above, covered with down on the inner face, on which is drawn a network of prominent nerves. They are accompanied by axillary stipules. The flowers<sup>2</sup> are arranged in the axil of the leaves in umbelliform cymes; their pedicels are slender and accompanied, at the base or higher up, by two or more bracts.

Beside *Pterandra* are placed several closely allied genera: the *Aemanthera*, from Brazil, distinguished by the development of the two large glands which their five sepals bear below and outside; by their anthers, which, besides the lateral appendages, present a special prolongation of their connective; and by their independent carpels, which become so many sessile utricles, and finally break towards the apex; the *Coleostachys*, from Guiana, whose calyx, destitute of glands, increases after floration, and whose stamens, united by the base of the filaments, are destitute of appendages. Their independent carpels appear indehiscent. The *Clonodia*, trees from

<sup>1</sup> *P. pyroidea* A. JUSS. *loc. cit.* 74, t. 179 b.—  
GRISEB. *Mart. Fl. Bras. Malpigh.* 30.—WALP. *Rep.* v. 130; *Ann.* vii. 469. *P. psidiifolia* A.

JUSS. *loc. cit.* 73, t. 179 b.

<sup>2</sup> Rosy, tomentose

Northern Brazil, have, on the contrary, calycine glands, like the *Acmathera*, and anthers without appendages; but the style is terminal, instead of being inserted towards the base of the internal angle of the ovary; the descendent ovule has its micropyle turned laterally (on account of the torsion of the raphe), and the fruit is composed of one or three achænes with rugose ridges on the back. The *Echinopteris*, Brazilian shrubs, have no calycine glands, their anthers are inappendiculate and the styles terminal. The three carpels are free in the ovary, and become achænes traversed on their dorsal line only by longitudinal ridges.

The *Heladena*, shrubs with slender branches, from Southern Brazil, whose sepals bear stipitate glands, are very analogous to the preceding genera; but, the three carpels being united below in a unilocular ovary, and becoming free only in the style, they form a transition from the *Clonodia* and the *Echinopteris* to the *Galphimia*.

The *Galphimia* (fig. 429-435), of which some pretty species may be seen in our gardens, have regular, hermaphrodite, and pen-

*Galphimia elegans.*



Fig. 433. Flower with perianth removed.



Fig. 429. Floriferous branch.



Fig. 434. Seed (♂).



Fig. 430. Bud.



Fig. 435. Longitudinal section of seed.



Fig. 431. Flower.



Fig. 432. Longitudinal section of flower.

tamerous flowers. On the slightly convex receptacle are inserted five sepals, generally destitute of glands and imbricate in the bud; five alternate, unguiculate, imbricate petals, and ten stamens, the

five shorter being superposed to the petals; they are each formed of a filament, free or united below to the neighbouring filaments, and an introrse anther, dehiscent by two longitudinal clefts. The superior ovary has three or, more rarely, four cells, separated from one another externally by deep vertical grooves, and surmounted by an equal number of apical, subulate, styline branches, whose pointed extremity is stigmatiferous. In the internal angle of each cell a descendent ovule is inserted above, whose micropyle is primarily turned upwards and inwards. The fruit is capsular, three or four coccus; and each coccus, dehiscent longitudinally at its back, contains a glabrous seed whose fleshy embryo has two cotyledons folded back towards the middle of their height and incumbent on the radicle. The albumen is wanting or nearly so (fig. 435). The *Galphimia* are frutescent or suffrutescent plants from the warm parts of both Americas. The leaves are opposite, entire or dentate, often having two glands at the base of the limb or towards the summit of the petiole. The flowers are arranged in terminal clusters, with articulate pedicels, and accompanied by lateral bracteoles. In certain *Galphimia*, generically separated under the name of *Blepharandra*, the stamens, instead of being glabrous, have all their parts covered with abundant hairs. The *Thryallis*, climbing shrubs from Brazil, have the flower of *Galphimia*, but their styline branches are terminated by a stigmatiferous swelling; the cells of the dry fruit do not open, and around it persist the accrescent sepals, which, when young, were strongly imbricate, as well as the petals. In *Lasiocarpus*, an upright shrub, not climbing, of Mexico, the floral characters are said to be the same as in the preceding types, the stamens remaining glabrous in all their parts, but the styline branches being filiform, bifid, and tortuous at their stigmatiferous apex, and the fruit globular, membranous, completely covered with branching purplish hairs.

The small group of *Spachea* also presents the same floral organisation; but the triangular and nearly valvate or slightly imbricate sepals, are furnished below and outside with one or, much oftener, two collateral and sessile glands. In the *Spachea* themselves, small shrubs from tropical America, the anthers are destitute of appendages, and the styline branches, two or three in number, are terminated by a truncate or slightly swollen extremity; whilst in

the *Lophanthera*, formed of trees from Brazil and Guiana, the cells of the anther bear on the exterior edge a wing-like expansion, nearly as in the *Pterandra*, and the styline branches are pointed at the apex. *Verrucularia*, a Brazilian shrub, with coriaceous and glaucous leaves, has the styles of *Lophanthera*, with anthers whose exterior edges bear each towards the apex a small appendage formed of turgescient cellules, whilst the five petals differ in the form and dimensions of the limb, which permits the definition of the plant: a *Lophanthera* with more or less irregular corolla.

In the *Malpighias* proper, the ovary is entire, divided internally into two or three cells, and the sepals are provided with glands.

*Malpighia nitida.*



Fig. 437. Fruit ( $\frac{2}{3}$ ).



Fig. 436. Longitudinal section of flower ( $\frac{2}{3}$ ).



Fig. 438. Longitudinal section of fruit.

*Malpighia* (fig. 436-438) has six to ten, with five sepals; and that is because either each sepal bears a pair of glands, or else these organs are wanting on one or two of the edges of certain calycine leaves. The stamens are also superposed, five to the sepals, and five to the petals. The latter are shorter and a little more exterior than the other five. The filaments are free and monadelphous at the base, and the anthers are bilocular, introrse, and dehiscent by two longitudinal clefts. The ovary cells are generally three in number, surmounted by the same number of styline branches with obtuse stigmatiferous apex. The fruit (fig. 437, 438) is a drupe with three monospermous kernels, whose back presents three or five vertical ridges, often bound together by irregularly projecting folds. The seed contains, under its coats, a straight embryo with fleshy plano-convex cotyledons and short superior radicle. The *Malpighia* are shrubs from the warm regions of the New World. Beside them are

placed half-a-dozen closely allied genera, also tropical American; *Byrsonima*, trees or shrubs, often climbing, whose drupaceous fruit has a trilobular core, and whose stamens are hairy below, whilst the styline branches are pointed; *Bunchosia*, whose stamens are completely glabrous, and whose styline branches, obtuse or truncate at the apex, are, consequently, like those of *Malpighia*, but united together to a variable extent, and also distinguished by drupes with two or three kernels destitute of dorsal projections and ridges; *Glandonia*, whose flower is that of *Byrsonima*, but whose staminal filaments are glabrous, and the fruit a unilocular and monospermous nut; *Diacidia*, also having the flowers of *Byrsonima*, with ten glands to the calyx, anthers whose cells are each surmounted by a small tuft of hairs, pointed styline branches, two or three in number, and a nucular fruit, with two or three cells; *Dicella*, with nucular unilocular fruit, whose two styline branches are truncate at the apex, and the stamens nearly always bristling with hairs. Moreover, the petals are unequal and unlike; making this genus, in this small group, analogous to *Verrucularia* among the *Spacheæ*; and the calyx is accrescent after efflorescence. In *Burdachia*, the dissimilar petals of *Dicella* are observed, and the dry unilocular fruit, often conical, has projecting vertical ribs; but the calyx is not accrescent; the glabrous staminal filaments rest on a glandular annular disk, and the styline divisions are pointed and subulate, instead of appearing truncate at the apex.

## II. BANISTERIA SERIES.

The flowers of *Banisteria*<sup>1</sup> are constructed very nearly the same as in *Malpighia*, with a calyx bearing eight or ten glands, more rarely without glands; five equal or unequal petals; ten stamens arranged in two verticels; anthers inappendiculate, or provided with a dorsal projection of the connective; an ovary with three uniovulate cells,

<sup>1</sup> L. Gen. n. 573 (part.).—J. Gen. 252.—134, t. 13.—SPACH, Suit. à Buffon, iii. 144.—  
LAMK. Diet. i. 666; Suppl. i. 572 (part.).—ENDL. Gen. n. 5579.—H. BN. Payer Fam. Nat.  
DC. Prodr. i. 587 (1 art.).—A. JUSS. l'epig. 312.—B. H. Gen. 57, n. 29.

surmounted by three styline branches, with truncate or capitate stigmatiferous apex. But what principally characterises this genus, as well as all those included in this series, is the organisation of the fruit (fig. 439), which is formed of one, two, or three samaræ dorsally surmounted by a vertical wing, membranous or nearly woody and traversed by ramified veins. The rest of its surface is smooth or covered with a variable number of points, prickles, or unequal ridges. The seed contains under its coats a fleshy embryo, straight or more or less recurved. *Banisteria* are shrubs, often sarmentose, climbing, whose leaves are opposite, more rarely verticillate by threes, often petiolate, glanduliferous at the base, entire, accompanied by independent or connate caducous stipules. The flowers<sup>1</sup> are collected in umbelliform cymes, often united in more or less ramified clusters, with pedicels placed in the axil of a bract more or less leaf-like and accompanied by two lateral bracteoles. About sixty species<sup>2</sup> of this genus are known, all natives of the tropical regions of the new world.

*Banisteria argentea.*

Fig. 439. Fruit.

Besides *Banisteria* are placed numerous genera whose fruits are analogous. *Peixotoa* (fig. 440), Brazilian shrubs, often climbing, having a valvate calyx with eight glands, and ten stamens, of which five, superposed to the petals, are alone provided with a fertile anther, whilst the other five have the filament surmounted by a glandular swelling. The leaves are opposite, accompanied by large confluent interpetiolate stipules, and the flowers are united, to the number of four, in small umbels enveloped at first by the large valvate bracts. *Ryssopterys*, climbing shrubs from the tropical regions of Australia, have the fruit and flower of *Banisteria*, but without glands to the calyx; leaves opposite or nearly so, with petiole bearing two glands,

<sup>1</sup> White or oftener rosy or yellow.

<sup>2</sup> H. B. K. *Nov. Gen. et Spec.* v. 158, t. 450.—  
A. Juss. *A. S. H. Fl. Bras. Mer.* iii. 35, t. 163,  
169.—GRISEB. *Mart. Fl. Bras. Malpigh.* 42, t. 8,

9.—Turcz. *Bull. Mosc.* (1858), i. 392.—Tr. et  
Pl. in *Ann. Sc. Nat. sér. 4*, xviii. 321.—WALP.  
*Rep.* v. 222; *Ann.* ii. 200; vii. 472.

stipules rather large ; flowers united, generally at the summit of the branches, in corymbiform cymes whose floral pedicels are articulate and accompanied by bractlets above and below. *Brachypterys*, shrubs from the shores of the Antilles and tropical continental America, have also the flower of *Banisteria*, with eight calycine glands and ten fertile stamens. The extremities of the styles are swollen out in a flattened blade or in the form of a reversed foot, and covered internally with stigmatic papillæ. The dorsal wing surmounting the cocci of the fruit is rather thick and short. The inflorescence resembles that of *Brachypterys*. The same may be said of *Stigmaphyllon*, climbing shrubs from tropical America, with leaves usually opposite. But, of the ten stamens, only six are provided with a fertile anther. Four of those which are alternipetalous

*Peizota glabra.*



Fig. 440. Flower, with perianth removed ( $\frac{1}{2}$ ).

have an anther, abortive, deformed, or even totally absent. The fruit is a samara with dorsal wing longer than in *Brachypterys*.

*Heteropterys*, shrubs, sometimes climbing, of tropical America and Africa, have the closest affinities with *Stigmaphyllon* and *Brachypterys*; they possess the carpels with developed dorsal wing of the former, and the styline branches with stigmatiferous apex in shape of a foot of the latter; they have moreover the flower of both with a calyx having eight glands or thereabouts. But the inflorescence is in simple or ramified clusters, with articulate pedicels accompanied by two lateral bractlets; a character of small value in itself, but which may serve provisionally to separate them from the two preceding genera. *Hentleophyton*, glabrous and tortuous shrubs from Cuba, is also closely allied. They are said to be distinguished by peltate or stipitate calycine glands, by styline branches with capitate stigmatiferous apex, and by carpels without wings, covered with long soft silk on the dorsal region. The flowers are described as arranged in axillary and slender clusters. Those of *Lophopterys*, a tree from Guiana, are terminal and ramified. The flowers are moreover analogous to those of the preceding genera, but for the calyx bearing only four large glands with radiating lamels and the carpels being separated from one another for the greater part of their length. They are, at maturity, woody, indehiscent, edged by a hard



and narrow ridge on the middle of the back and upper part. *Sphedannocarpus*, natives of the warm regions of tropical Africa, Madagascar, and the Cape, is also very analogous to *Heteropterys*. But the sepals are destitute of glands; the three styline branches are slender, elongated, incurvate; and the flowers are collected in small terminal clusters of false umbels, often quadriflorous. This genus had formerly been assigned, as a simple section, to *Acridocarpus*, inhabiting tropical and southern Africa, Madagascar, Arabia, and Persia, and even New Caledonia, and distinguished by leaves usually alternate, sepals with glands wanting or very slightly developed, and styline branches only two of which are very long, slender, rolled inwardly in a spiral in the upper part, whilst the third is very short, rigid, upright, or nearly wanting. The fruit is formed of one, two, or three large samaræ whose base, flat or concave, is applied to the sides of an elongated receptacle.

*Tricomaria* and *Ptilochaeta* have also been joined to this series. The former is a curious shrub from the Cordilleras of La Plata, having opposite branches, ending in spines and covered by a silky down, just like the very small, lanceolate leaves (analogous to those of *Krameria*). The flowers, solitary or collected in triflorous cymes, are very like those of *Banisteria*; but the ovary is surmounted by three styline branches, one of which is rudimentary, very short, as in *Acridocarpus*, whilst the other two are very like those of *Brachypterys*; and the trilobate fruit is covered with long tufts of hair. *Ptilochaeta*, a shrub still imperfectly known, native of the environs of Bahia, has opposite well developed, oval, exstipulate leaves, and axillary flowers, often solitary, pedunculate, whose calyx has no glands, and whose androceum is composed of ten stamens with filaments completely joined at the base. The trilocular ovary is surmounted by three capillary and flexuous styline branches; and the trilobate fruit is covered with long patulous and feathery dorsal hairs. The seeds contain an uncinate embryo, with flat cotyledons, incurvate and incumbent.

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## III. HIRÆA SERIES.

Whilst in the plants of the preceding series, the wings bearing the carpels are dorsal (*Notopterygiæ*), in these they are lateral (*Pleuropterygiæ*), or at least that is most usually the case (without however the development of the dorsal wing being constantly wanting). The flower presents no fundamental difference to that of *Malpighia* or *Banisteria*.

*Hiræa* (*Mascagnia*) *elegans*.



Fig. 441. Ripe carpel.

In *Hiræa*<sup>1</sup> itself, for example, there are five sepals, bearing eight or ten glands, or, more rarely, without glands, five uncut petals, two verticels of five stamens, three carpels with uniovulate ovaries and short truncate styline branches; and the fruit is formed of one to three samaræ (fig. 441), whose dorsal wing is wanting or but slightly developed, the edges being dilated in two large reticulate wings which are even joined more or less completely above and below, so as often to form only one peltate and veined surface. *Hiræa* consists of shrubs, often climbing, of tropical America, where about fifty species<sup>2</sup> are enumerated. They have opposite leaves, and flowers<sup>3</sup> collected in clusters or axillary corymbs, more or less ramified and composed of cymes, with articulate floral pedicels, sessile or not, and bearing two opposite bractlets in the upper part.<sup>4</sup>

Close beside *Hiræa* are placed *Diplopterys*, *Tetrapteryx*, and *Triopteryx*, also belonging to the warm regions of America. *Diplopteryx* has sepals without glands and petals fimbriate on the edges. The samaræ have five wings, the least having generally the shape of a short vertical ridge, whilst the lateral, confluent above and below, form two thick plates towards each edge. *Tetrapteryx* has usually

<sup>1</sup> JACQ. *Stirp. Amer.* 137, t. 176, fig. 42.—DC. *Prodr.* i. 586 (part.).—A. JUSS. *Malpigh.* 294, t. 19.—SPACH, *Suit. à Buffon*, iii. 139.—ENDL. *Gen.* n. 5568.—B. H. *Gen.* 260, n. 40.—H. BN. *Payer Fam. Nat.* 312.

<sup>2</sup> H. B. K. *Nov. Gen. et Spec.* v. 169.—A. JUSS. in A. S. H. *Fl. Bras. Mer.* iii. 13, t. 164.—GRISEB. *Linnaea*, xiii. 239; *Mart. Fl. Bras. Malpigh.* 98,

t. 20.—TR. et PL. *Ann. Sc. Nat. sér. 5*, xviii. 326.—WALP. *Rep.* v. 320; *Ann.* i. 131; ii. 205 iv. 370; vii. 474.

<sup>3</sup> Yellow, rosy or blue.

<sup>4</sup> Two sections are distinguished: 1° *Euhiræa* (*Hiræa* A. JUSS.); 2° *Mascagnia* (BERT. ex COLL. *Hort. Rip.* 86.—GRISEB. *Fl. Brit. W.-Ind.* 121; *Fl. Bras.* 89, t. 18, 19.

eight calycine glands, petals entire or fimbriate, and the wings of the samaræ diverging like a cross. In *Triopterys*, the calyx also has glands, the petals are very nearly entire, and each of the samaræ forming the fruit is provided with three wings, two above and one below, confluent by their bases towards the edges.

In the old world, there are analogous types represented by the genera *Aspidopterys*, *Triaspis*, and *Flabellaria*: the first Indian, and the other two African; all destitute of calycine glands. In *Aspidopterys*, sessile petals are seen, styline branches with dilated stigmatiferous apex, fruit formed of membranous, scutiform, elongated samaræ, and opposite leaves without glands or stipules. *Triaspis* also has leaves without glands, and membranous scutiform samaræ; but the petals are fimbriate and unguiculate, and the subulate styline branches are flexuous, stigmatiferous towards the apex. With the same style, *Flabellaria* has a valvate calyx with unequal divisions, sessile, narrow, elongated petals, often lanceolate, and the scutiform samaræ bear a small dorsal wing. The petioles are glandular.

In *Jubelina*, inhabiting Guiana, the flowers are very nearly the same as in the preceding genera, but collected in quadriflorous false umbels and provided with an involucre. Of the five sepals, four only bear a large medial gland below and without, and the styline branches terminate in a stigmatiferous extremity dilated in the shape of a reversed foot. The fruit is formed of three samaræ bearing five vertical dorsal wings irregularly cut and appearing to be each divided into three hollows. The medial alone is a true cell containing the seed.

In *Hiptage* (fig. 442), each samara bears only three wings, two lateral and one dorsal. The calyx possesses only a single gland; it is large, elongated, alternate with two sepals, and descends on the apex of the pedicel to which it is adnate. Of the ten fertile stamens, one only exceeds all the others in length. *Hiptage* is composed of climbing shrubs of tropical Asia. Of the three styline branches, one

*Hiptage Madagblota.*



Fig. 442. Ripe carpel.

only, or rarely two, is largely developed, the others remaining rudimentary. It is the same with *Tristellateia*, inhabiting Madagascar and tropical Oceania, having a calyx without glands or with rudimentary ones, unguiculate petals, flowers in clusters, and a fruit whose samaræ are furnished with a circular marginal wing cut in unequal lobes, rigid, entire or not at the apex, spreading starlike, often with a dorsal ridge of small size and more or less deeply laciniate.

*Dinemandra glauca.*



Fig. 443. Flower (♂).



Fig. 446.  
Gynæceum (♀).



Fig. 444. Longitudinal  
section of flower.

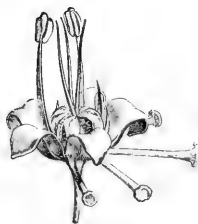


Fig. 445. Flower with  
corolla removed (♀).

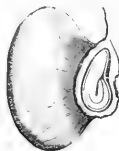


Fig. 448. Ripe Carpel,  
longitudinal section.

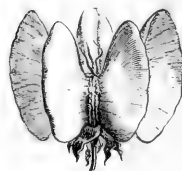


Fig. 447. Fruit.

The two Chilean genera *Dinemagonum* and *Dinemandra* (fig. 443-448) are considered as genera intermediate between this series and the following, being represented by small suffrutescent plants, with narrow leaves, having long-stipitate calycine glands, unequal petals, stamens only partially fertile: two or three in *Dinemandra*, eight in *Dinemagonum*. The anthers are linear-oblong, and to the trilobed

ovary succeeds a fruit formed of three small samaræ, surrounded by a marginal wing and bearing on the back, like those of *Tristellateia*, a small ridge unequally dentate on its free edge.

#### IV. GAUDICHAUDIA SERIES.

This small group has been formed of some genera whose principal character consists in the diminution of the androceum (whence the name of *Meiostemones*). The flowers, on the type 5, have in fact stamens not exceeding six in number, and those generally correspond

*Schwannia elegans*.



Fig. 449. Flower (†).



Fig. 450. Flower with perianth removed (†).

to the petals that are wanting. Again, several of them are transformed into sterile staminodes. There is otherwise scarcely a constant form except in *Schwannia*<sup>1</sup> (fig. 449, 450), by which the study of this series may be commenced. The flowers are regular and hermaphrodite. The quinquefidal or quinquepartite calyx bears seven or eight glands. The alternate unguiculate petals have a fimbriate limb. The stamens are six in number and all fertile, superposed five to the sepals and the sixth to a petal. The filaments

<sup>1</sup>ENDL. *Gen. n.* 5563. — A. JUSS. *Malpigh.* 351, t. 22. — B. H. *Gen.* 262, n. 49. — H. BN. in *Payer Fam. Nat.* 312. — *Fimbraria* A. JUSS. in *A. S. II. Fl. Bras. Mer.* iii. 63, t. 173 (not NEES). — SPACH, *Suit. à Buffon*, iii. 155.

are free except in a variable extent of the lower part, and the anthers are bilocular, introrse, dehiscent by two longitudinal clefts. The gynæceum is composed of three ovaries, almost or completely independent, from whose base rises a style, or more rarely two or three (unequal in that case), whose stigmatiferous apex is more or less dilated. In the internal angle of each ovary is found a placenta supporting a descendent anatropal ovule with superior micropyle, finally lateral. The fruit is formed of one to three samaræ, whose backs are surmounted by a vertical wing, analogous to those of

*Janusia guaranitica*.



Fig. 451. Flower ( $\frac{1}{2}$ ).



Fig. 452. Longitudinal section of flower.

*Banisteria* (fig. 439), and whose cavity contains a bent seed, with ventral hilum, coats thin covering a fleshy embryo, superior short radicle, and thick cotyledons usually unequal. *Schwannia* consists of climbing shrubs; five species<sup>1</sup> have been distinguished, natives of tropical Brazil. The leaves are opposite, and the flowers are arranged in small umbelliform cymes, often quadrifloriate, generally collected in compound terminal clusters.

*Janusia* (fig. 451, 452) is allied to *Schwannia*; the petals are entire, and the stamens, ten in number, may all be fertile; but it also happens that one or a small number of them remain sterile. The fruit is also formed of two or three samaræ. But the most remarkable fact observed in this genus, and which will be found in all those following it, is, that beside the normal flowers, there are,

<sup>1</sup> GRISEB. *Linnaea*, xiii. 188 (*Fimbriaria*); *Rep.* 9, t. 1.—WALP. *Rep.* v. 353; *Ann.* vii. *Mart. Fl. Bras. Malpigh.* 101, 102, t. 221 476.  
(*Janusia*).—GRISEB. *Pacif. Sarr.* vii. *Bot.* <sup>2</sup>Red.

on the same plant, abnormal ones, showing an important diminution of all the organs. The calyx no longer has glands. The corolla is smaller or wanting. There is often only a rudimentary stamen to represent the androceum, and the two carpels constituting the gynæceum have a style rudimentary or even wanting. The species of *Janusia* are Californian and Brazilian. It is only in Brazil that the

*Camarea cricoides*.

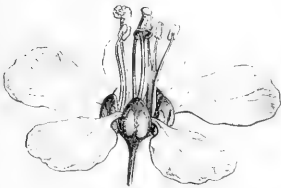


Fig. 453. Flower (♂).



Fig. 454. Longitudinal section of flower.



Fig. 455. Flower with perianth removed.



Fig. 457. Fruit.



Fig. 458. Seed.



Fig. 456. Gynæceum.

species of *Camarea* (fig. 453-458) are met with. They have six stamens like *Schwannia*; but two of them become sterile and show a quite peculiar configuration (fig. 445). The fruit is formed of two to four achenes with backs covered with stings or soft scales, rarely having a short vertical wing. *Aspicarpa* belongs to western central America, especially Mexico and Texas; it has only five stamens superposed to the sepals. Two only are fertile and united below; the others are free and sterile. The fruit is formed of achenes,

naked or having two or three dorsal ridges. Finally, *Gaudichaudia* (fig. 459–461), representing the most incomplete type of this family, has only five stamens in the normal flowers, three only being usually fertile (fig. 459), and three carpels, one alone presenting generally a

*Gaudichaudia congestiflora.*

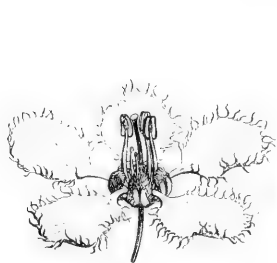


Fig. 459. Flower ( $\frac{3}{4}$ ).



Fig. 461.  
Gynæceum.

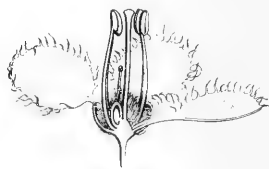


Fig. 460. Longitudinal section  
of flower.

developed and gynobasic style (fig. 461). The fruit is formed of one or two samaræ supported by a filiform foot and provided with a marginal wing and dorsal ridge. This genus is formed of slight shrubs often volubile, inhabiting Mexico, Venezuela, and Columbia.

The *Malpighiaceæ*<sup>1</sup> form a very natural small group in which monographers have traced artificial divisions, according to characters whose value would elsewhere be considered very small. It may be strictly said of this, as of many other families, that it is a large natural genus whose divisions have been too much multiplied, and will unfortunately be still more so if the same principles continue to be applied. With the older botanists down to LINNÆUS, all known *Malpighiaceæ* were *Malpighia*, *Banisteria*, and *Triopterys*. At the end of the last century and the commencement of the present, CAVANILLE had added

<sup>1</sup> *Malpighia* J. Gen. 252, Ord. 7.—*Malpighiaceæ* J. Ann. Mus. xviii. 479.—DC. Prodr. i. 577.  
—ENDL. Gen. 1057, Ord. 228.—LANDL. Nat. Syst.

121, Ord. 92; *Veg. Kingd.* 388, Ord. 139.—J. G. AGARDH, *Theor. Syst. Plant.* 291.



the genera *Galphimia*, *Flabellaria*, *Tetrapteryx*; GÆRTNER, the genus *Hiptage*; JACQUIN, the genus *Hirca*. In 1789, A. L. DE JUSSIEU had well established an order of *Malpighicæ*; but he only included the three genera of LINNÆUS, and, as types allied to the series, *Trigonia* (*Polygalacæ*) and *Erythroxyllum* (*Linacæ*). When in 1843, A. DE JUSSIEU published his monograph<sup>1</sup> on this family, to which he is supposed to have given the most care, he found twenty genera established by his predecessors, and added nineteen; which, without counting two genera still very doubtful,<sup>2</sup> raises the total number at that epoch to thirty-nine. Ten new genera have been added since then: *Flabellaria* of GÆRTNER, confounded by A. L. DE JUSSIEU with *Triaspis*, has been distinguished anew by BENTHAM and HOOKER,<sup>3</sup> who have also separated the *Sphedamnocarpus* of PLANCHON from *Acridocarpus*. The genus *Ptilochæta* had been proposed by TURCZANINOW in 1843; *Lasiocarpus*, by LEIBMANN in 1854, and *Henleophytum*, by KARSTEN in 1860. But the author who latterly has most occupied himself with this family, especially in editing the *Flora Brasiliensis* of MARTIUS, A. H. R. GRISEBACH, has also published most of the new genera of *Malpighiaceæ*: *Aemanthera*, *Blepharandra*, *Clonodia*, *Diacidia*, *Glandonia*, etc. Altogether we keep forty-eight genera, containing nearly six hundred and thirty species, and all are American except some fifty. These latter are divided among the seven genera belonging to the old world, all the others belonging to the new. The most widespread, as to geographical distribution of the types of the old world, are *Tristellateia* and *Acridocarpus*. They are principally African, and both exist in Madagascar. The latter is also met with in tropical western Africa; but, singularly enough, both of them are represented by a species in the warm parts of Oceania. A *Tristellateia* has even been seen in Australia, and a species of *Acridocarpus* belonging properly to New Caledonia. *Flabellaria*, *Sphedamnocarpus*, and *Triaspis* are found only in Africa. *Aspidop-*

<sup>1</sup> *Monographie des Malpighiacées, ou exposition des caractères*. . . Paris (1843), in-4.

<sup>2</sup> 1st. *Caucanthus* (Forsk., *Fl. Æg.-Arab.* 91). A genus which appears to approach *Flabellaria* in most of its characters, but it has not its fruit, and which ought, it is supposed, to be referred to *Aneulophus* (pp. 51, 56) of the family of the *Linacæ* (ENDL. *Gen.* n. 5594;—B. H. *Gen.* 251;

—WALP. *Rep.* v. 357). 2nd. *Bembix* (LOUR. *Fl. Cochinch.* (ed. 1790), 282;—ENDL. *Gen.* n. 5595, 6877; B. H. *Gen.* 251). A genus whose decandrous flower is said to have nearly the characters of that of the *Malpighiaceæ*, but with a tripartite calyx. The fruit is small, fleshy, trilobular.

<sup>3</sup> *Gen.* 247, Ord. 36.

*terys*, *Ryssopterys*, and *Hiptage*, all belong to tropical Asia and Oceania. There is not one species of the *Malpighiaceæ* and *Gaudichaudieæ* series that is not American. Nine genera of *Banisterieæ* and seven of *Hirceæ* are so likewise. "Brazil," says A. DE JUSSIEU, "seems the true country of the *Malpighiaceæ*, so noticeable are they by their number and variety in this part of the earth more than in any other." There are, in fact, twenty-five of the American genera represented in that country, and by a considerable number of species (nearly two hundred and ninety). Some American genera, monotype or with very few species, belong only to Guiana and Columbia, as *Coleostachys*, *Diacidia*, *Lophopterys*, *Diplopterys*, and *Jubelina*. Mexico, where the species of *Malpighiaceæ* (many of which remain to be described) are not rare, owns the monotype genera, *Lasiocarpus* and *Echinopterys*. To Chili or the neighbouring parts of Peru belong the two exceptional (or perhaps congeneric) types *Dinemandra* and *Dinemagonum*. *Tricomaria* is still more southern and also more abnormal as to aspect and foliage, analogous to those of certain *Rhamnaceæ* of arid countries. No *Malpighiaceæ* of North America have been observed above 40° north latitude; there are only three or four at the Cape, a couple in Australia, and at the most half-a-dozen in the rest of Oceania. They are then, especially, plants of tropical regions, and the majority American.

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Their affinities with the *Erythroxyloæ* and *Nitrariæ* have been recognised by all writers. They rarely have the alternate leaves of *Erythroxyloæ*, but in that case, they do not possess their so characteristic intra-axillary stipules. *Anculophus*, on the contrary, has petiolate leaves and intra-petiolate stipules; but is distinguished by the geminate ovules in each cell, with the micropyle turned directly upwards and outwards. The *Erythroxyloæ* have an abundant fleshy albumen in the seed. In *Nitraria* the leaves are alternate, the petals valvate-induplicate and not twisted, and the ovule, suspended next its funicle, turns its micropyle directly upwards and inwards. But the *Sapindaceæ* especially are closely allied to the *Malpighiaceæ*, having nearly all their important characters particularly in the regular types. The *Malpighiaceæ*, however, have no appendages to the

petals; the disk is generally entirely wanting, and it never forms a regular or irregular enclosure outside the androecium. The latter is nearly always formed of ten parts arranged on two equal and complete verticels. The gynæceum of the *Malpighiaceæ* is always exactly central. In its ovary cells, two or three in number, there is never more than one ovule, always descendent, with the micropyle superior, nearly always carried back, in consequence of torsions on one side of the point of attachment. Moreover, the leaves of the *Malpighiaceæ* are nearly always opposite, an exceptional character in the *Sapindaceæ*, and they are never compound. On another side, the *Meliaceæ*, in consequence of their great analogies to the regular *Sapindaceæ*, are also brought near the *Malpighiaceæ*; they have an hypogynous disk, usually well developed, ovary cells often biovulate, occasionally pluriovulate, descendent ovules, with micropyle turned directly upwards and outwards. The leaves are alternate, frequently compound-pinnate.

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The characters varying in this group and serving, consequently, to distinguish the series and genera, are, in the first place, as we have seen, those drawn from the configuration of the fruit and the absolute number of the stamens. A. DE JUSSIEU named the *Banisteriaceæ* *Notopterygiæ*, the *Hireæ* *Pleuropterygiæ*, the *Malpighicæ* *Apterygiæ*, the three collectively diplostemonous, and the *Gaudichaudicæ* meiostemonous. Then come, in a lower rank, the presence or absence of the calycine glands;<sup>1</sup> the equality or inequality of the petals, entire or dentate; the glabrous or hairy surface of the parts of the androecium; the independence or union of the ovary cells; the configuration of the styline branches; the details of the configuration of the fruit, the wings, sides, ridges, or hairs; the variations of the inflorescence; the existence or not of glands or hairs on the surface of the leaves and organs of vegetation. The latter frequently assume, in this family, a form from which they derive their name of *Malpighiaceous*, or shuttle-shaped hairs. They are to a certain

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<sup>1</sup> These glands have been studied principally by A. DE JUSSIEU (*Malpigh.* 33, 92, t. 2), who has analysed the tissue and secreted product, and has shown its slight value for classification. Their evolution on the calyx is usually tardy;

very often they are lateral with reference to the exterior face of the sepals. To us, they appear analogous to the stipular glands so frequently observed in the family of *Euphorbiaceæ*.

extent more or less elongated spindles, rigid, pointed at both extremities, and laid horizontally on the surface of the leaves, where they are kept by a base of insertion corresponding to the middle of their length or nearly so. The histologic organisation of the stalks is also often quite special in these plants, usually frutescent, very rarely suffrutescent (*Galphimia*, *Canarea*, *Aspicarpa*, *Janusia*), and often climbing, by leaning against or twisting round trees, even to a great height (*Hiptage*). In these cases principally, the contours of the woody zone are deeply sinuous, and these sinuosities are seen more or less distinctly on the outer surface of the bark. The largest bindweeds often have the form "of a cable composed of several cords twisted together. They seem, at first sight, to result from the close junction and torsion of several branches; but a closer examination does not justify this opinion, since, if each of these pretended branches has its bark, the central one alone has a pith and medullary sheath." A. DE JUSSIEU (whom we have just quoted) attributes this arrangement to the fact that, whilst in ordinary stalks the woody bundles are, at all ages, developed in the periphery with uniformity, the woody body of these bindweeds is unequally developed in different directions. Hence, the formation of lobes and interposed cavities on which the bark moulds itself; the contour in contact with this augmenting progressively in length, "whilst the junction with the wood preserves its primitive dimensions, and even, if the woody bundle separates a little in rising, this continuation, more and more narrow, finally disappears." The interposition of layers of cortical tissue to the more or less projecting and independent segments of the woody body presents very great variations; it may even go so far as the total separation of the woody body into several secondary masses, "thus giving to a single branch the appearance of several, collected or twisted together."<sup>3</sup> The *Malpighiaceæ*, like many other bindweeds, are remarkable for the extreme development

<sup>1</sup> See A. JUSS. *Malpigh.* 96, t. 2. At the base of the hair, or a little lower, the epidermis supporting it contains a gland, formed of small cells, often secreting an acrid, burning liquid, the cavity of the hair becoming its very thick coated reservoir.

<sup>2</sup> MART. *Gelehrte. Anzeig.* (1842), 389.—LINDL. *Introd. to Bot.* i. 212.—A. RICH. *Elém. Bot.* éd. 10, 79, fig. 47.—CRUEGER, in *Bot. Zeit.* (1851),

465.—WIGAND, *Ein. Beisp. Anom. Bild. des Holzkörpers* (in *Flora* (1856), 673, fig.).—GAUDICH. *Guillem. Arch. Bot.* ii. 502, t. 19; *Rech. sur l'Organis. des Végét.* t. 18 (11).—H. MOHL, *Ueb. d. Bau d. Ranken- und Schlingpflanzen*, Tübing. 1827), § 75.—A. JUSS. *Compt. Rend. Acad. Sc.* xii. 546; *Ann. Sc. Nat.* sér. 2, xv. 234; *Malpigh.* 100, t. 3.—OLIV. *Stem. in Dicot.* 1.

<sup>3</sup> In certain genera, like *Heteropterys* (those

in their wood of punctate tubes. Some also by "the absence of liber in all the layers, the first excepted, under which the fibres are found disseminated."

The uses<sup>1</sup> of the *Malpighiaceæ* are not numerous. In general, they are plants with astringent wood and bark, rather rich in tannin, sometimes also in red colouring matter. The *Byrsonimas* are the best known, on this account, in tropical America. It was formerly believed that Alcornoque Bark, in repute for its astringent, tonic, and febrifuge qualities, was partly furnished by *B. coccolobifolia* K. and *laurifolia* K. In Guiana, the bark of *B. crassifolia*<sup>2</sup> has also been considered as a sort of Alcornoque. Under the name of *Chabarro* and *Chapara manteca* it is employed to treat the bite of the rattlesnake and for intermittent fevers and various inflammatory affections of the lungs and bronchia. *B. verbascifolia*,<sup>3</sup> from the same country, has a red wood, much used in dyeing, and its febrifugal virtues are vaunted. *B. spicata*<sup>4</sup> is also rich in tannin, whence its common name of Tan wood; it is used in manufactures and medicine, and in cases of dysentery its fruits, acidulate and astringent, have been prescribed. In Mexico, the bark of *B. cotinifolia*<sup>5</sup> has been especially applied to the same uses. *B. chrysophylla*, from South America, and some species of *Bunchosia* from the same country, have an astringent principle, a red tinctorial bark. The fruit of *B. tuberculata* is used to prepare a carmine tincture. In the genus *Malpighia*,<sup>6</sup> the fruit is often edible, being sweetish, mucilaginous,

at least that have been studied), the bark, penetrating into the deep grooves separating from one another the projections of the stem, doubles itself, so to speak, without its two surfaces adhering externally. In others (*Banisteria*, *Stigmaphyllon*), there is only a single cortical process in each groove; so that the stem does not appear outwardly divided into lobes and its woody projections are only seen in a transverse section.

<sup>1</sup> ENDL. *Enchirid.* 557.—LINDL. *Veg. Kingd.* 390.—ROSENTH. *Syn. Pl. Diaphor.* 772, 1152.—MART. *Fl. Bras. Malpigh.* 121.

<sup>2</sup> H. B. K. *Nov. Gen. et Spec.* v. 149.—ROSENTH. *op. cit.* 773.—*B. rhopalaefolia* K.—*B. montana* K.—*B. ferruginea* K.—*B. Cumingiana* A. JUSS.—*B. Karwinskiana* A. JUSS.—*Malpighia Mourvella* AUBL.—*M. Crassifolia* AUBL.

(*Yuco*, *Nanci*, *Chaparro* of the Columbians, *Quinquina des Savanes*).

<sup>3</sup> RICH. ex A. JUSS. *Malpigh.* 26.—*Malpighia verbascifolia* L.

<sup>4</sup> DC. *Prodr.* i. 580 (*Bois Dysentérique*, *Mérisier Doré*).

<sup>5</sup> H. B. K. *Nov. Gen. et Spec.* v. 152, t. 447.

<sup>6</sup> H. B. K. *Nov. Gen. et Spec.* v. 15.—*Galphimia chrysophylla* SPRENG.

<sup>7</sup> DC. *Prodr.* i. 581, n. 7.—*Malpighia tuberculata* JACQ. *Hort. Schænbr.* i. 54, t. 104.

<sup>8</sup> The common name of *Mourveller* is said to come, perhaps, from the Galibic *Mourrei* or the Indian *Morecy*, *Muriei*, words which, it is supposed, indicate that the nourishment derived from it is insufficient. (MART.)

acidulate or slightly astringent. Their colour and shape have often given to the shrubs bearing them the name of Antilles or Barbadoes cherries. Such are *M. aquifolia*,<sup>1</sup> *coccifera*,<sup>3</sup> *fucata*,<sup>2</sup> *punicifolia*,<sup>4</sup> introduced into our greenhouses and esteemed for the elegance of their flowers.<sup>5</sup> They are less beautiful however than the species of *Galphimia* with long clusters of yellow flowers, frequently cultivated by us. *M. glabra*,<sup>6</sup> a native of Mexico, and Nicaragua, has received the common names of *Xocol* and *Xochtol* (that is to say berry). In Jamaica, it is cultivated for its fruit. The same with *M. urens*<sup>7</sup> in the French Antilles, under the names of *Bois-capitaine* (Fr.), *Brind'amour* (Fr.), etc. The flesh of the pericarp has an agreeable bitterish taste, is easy of digestion, and is supposed to dilute and refresh the blood. A rob is prepared from it, or it is made up with jelly and preserved fruits, and used for diarrhoea, hæmorrhage, leucorrhœa and inflammatory fevers. *M. punicifolia* has also an edible fruit; it is eaten rolled in sugar, and a refreshing juice is prepared from it; it is said to be laxative beyond a certain dose. The wood is used for tanning and dyeing red. Remarkably enough, whilst the Brazilians have long recognised as edible the fruit of *Byrsonima*,<sup>8</sup> especially those of *B. crussifolia*, *intermedia*, *pachyphylla*, *sericea*, *spicata*, and those of several *Bunchosia*, the almonds of *B. Armeniaca*,<sup>9</sup> are supposed to be poisonous; and whilst the bark of so many species of *Malpighiaceæ* form astringent remedies, the root of *Banisteria Pragua*<sup>10</sup> is employed in Brazil, according to VELLOZO, as an evacuant, sometimes substituted as laxative and emetic for *Cephalis Ipecacuanha*. The wood of the *Malpighiaceæ* is neither heavy nor hard, but it is sufficiently resistant to serve for the fabrication of beams

<sup>1</sup> L. Spec. 611.—Cav. Diss. viii. 409, t. 236.—*M. ilicifolia* MILL.

<sup>2</sup> L. Spec. ed. REICH. ii. 371.—JACQ. Ic. Rar. t. 470.—*M. coccifera* L. This species owes its name, like several others, to being used as a retreat by insects (*Cynips*?) who puncture the leaves to deposit their eggs, and it becomes, in consequence, covered with galls, in the thickness of which the larvæ may find nourishment.

<sup>3</sup> KER, in Bot. Reg. t. 189.—*M. Macrophylla* DESF. Cat. Hort. Par. 169 (nec PERS.).—TURP. Dict. Sc. Nat. Atl. t. 164 (*Mouretiller* with large flowers.)

<sup>4</sup> L. Spec. 609.—A. JUSS. *Malpigh.* 10, n. 12.

<sup>5</sup> These flowers are often very odorous; they attract bees, and DE MARTIUS advises planting

hedges of them in tropical America, so that these insects may pillage them.

<sup>6</sup> L. Spec. 609.—Cav. Diss. 406, t. 234 (*Jamaican Cherries*).

<sup>7</sup> L. Spec. 6019.—Cav. Diss. 407, t. 235 (*Cerisier-capitaine*, de Courwilt, Bois Hinselin, Couhaye).

<sup>8</sup> MARCGR. Bras. (ed. 1648), 118.—PISO, Bras. (ed. 1658), 171 (*Mureci petinga*, *M. guacu*).

<sup>9</sup> RICH. DC. Prodr. i. 582, n. 11.—*Malpighia Armeniaca* Cav. Diss. 410, t. 238.

<sup>10</sup> VELLOZ. Fl. Flum. 190, iv. t. 158.—? *Heteropterys Syringæflora* GRISEB. *Linnaea* xiii, 223.

and rafters for roofs. In Cochinchina, *Bembix tectoria* takes its specific name from being used to preserve the roofs of houses and vessels from atmospheric action<sup>1</sup>. In Brazil *Byrsonima verbascifolia* attains sufficiently large dimensions to be used for making beams and large tables. It is yellow or reddish according to age and is used in cabinet work. The wood of *B. crassifolia* is more compact and harder. That of the climbers of this family is used to make pretty boxes and small ornaments.<sup>2</sup>

<sup>1</sup> LOUR, *Fl. Cochinch.* (ed. 1790), 283.

<sup>2</sup> MART. *Fl. Bras. Malpigh.* 123.

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## GENERA.

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### 1. MALPIGHIEÆ.

1. **Pterandra** A. JUSS. — Flowers hermaphrodite regular; receptacle cupuliform subplane. Sepals 5, inserted at margin of receptacle and more or less confluent with it at the base, thickened externally into 10 distinct subequal, or unequal and scarcely distinct glands; præfloration imbricate or sub-valvate. Petals 5, unguiculate, externally pubescent, imbricate. Stamens 10, inserted in 2 series with the perianth; filaments free or connate at the base; the alternipetalous longer; anthers introrse glabrous; cells externally winged, longitudinally rimose; connective beyond cells somewhat thickened obtuse. Carpels 3; germen subfree; styles ventral sub-basilar free subulate to stigmatose apex; ovule in cells 1, inserted in internal angle, arcuate; micropyle superior, finally as regards the funicle lateral. Nuts 1–3, each shortly and thickly stipulate; seed globose; testa membranous; cotyledons of exalbuminous embryo fleshy complanate convolute; interior longer spirally circinate; radicle superior short. — Small sericeo-tomentose trees; leaves opposite entire subcoriaceous venose; stipules exarillate; flowers axillary in subumbellate or fasciculate cymes; pedicels oftener bracteate and at base 2-bracteolate. (*Brazil*.) See p. 429.

2. **Acmanthera** GRISEB.<sup>1</sup> — Flowers nearly of *Pterandra*; calyx widely 10-glandulose. Stamens 10; filaments subdistinct;<sup>2</sup> anthers glabrous; cells externally alate; connective produced beyond cells to a recurved lamina. Carpels 3, mature utriculiform,<sup>3</sup> finally bursting at apex. Testa of subglobose-angular seed coriaceous;

<sup>1</sup> MART. *Fl. Bras. Malpigh.* 28.—B. H. *Gen.* 253, n. 8.

<sup>2</sup> Base with receptacle hirsute.

<sup>3</sup> Apex sericeo-comose.



cotyledons of exalbuminous embryo thick, equal or unequal; radicle short superior.—Glabrous or in part sericeo-tomentose trees; leaves opposite petiolate ample oblong entire eglandulose; stipules connate in pairs in one axil; flowers<sup>1</sup> in axillary racemes; bracts and bracteoles of pedicels concave. (*Tropical Brazil*.<sup>2</sup>)

3. **Coleostachys** A. JUSS.<sup>3</sup>—Calyx eglandulose; sepals 5, accrescent after anthesis. Petals 5, shortly unguiculate. Stamens 10, 1-adelphous at base; tube barbate; anthers inappendiculate. Gynæceum, etc., of *Pterandra*. “Fruit from 1–3 indehiscent (?) carpels, conflated.”—A tree; leaves ample opposite oblong entire; stipules very long axillary, connate at base; flowers in axillary spikes sheathed at base with leaf reduced to connate stipules, subsessile, bracteate and 2-bracteolate. (*Guiana*.<sup>4</sup>)

4. **Clonodia** GRISEB.<sup>5</sup>—Flowers nearly of *Aemantthera*; calyx 8-glandulose. Anthers inappendiculate. Carpels connate in 3-locular germen; styles thickish terminal, truncate at stigmatose apex. Fruit from 1–3 nuts, depressed, obliquely rostrate, irregularly cristate, finally solute. Other characters of *Pterandra* (or *Aemantthera*).—Small trees; branches lenticellate; leaves opposite, ovate or oblong, entire subcoriaceous; petiole above the base 2-glandulose; stipules not conspicuous; flowers<sup>6</sup> in terminal lateral racemes; bracts and bracteoles small. (*North Brazil*.<sup>7</sup>)

5. **Echinopterys** A. JUSS.<sup>8</sup>—Calyx eglandulose. Petals 5, subequal or unequal pubescent. Stamens 10, 1-adelphous at base; anthers inappendiculate villose. Carpels 3; germens free, more or less coalite<sup>9</sup> to internal angle (by means of indumentum); styles terminal free, unequally dilated at stigmatose apex. Fruit 3 cocci, indehiscent, at back unequally lappulaceo-echinate.—A shrub; leaves small, opposite and alternate entire; stipules setaceous;

<sup>1</sup> Rather large.

<sup>2</sup> Spec. 1, 2. A. JUSS. *Deless. Icon.* iii. 19, t. 30; *Malpigh.* 64, t. 6, fig. inf. dextr. A. (*Pterandra*).—WALP. *Ann.* vii. 468.

<sup>3</sup> *Malpigh.* 59, t. 5 (not BENTH.).—B. H. *Gen.* 253, n. 10.

<sup>4</sup> Spec. 1. *C. genipifolia* A. JUSS. *loc. cit.* 60. —WALP. *Rep.* v. 178. (Alien genera are *C. hypoleuca* and *vestita* BENTH. *Hook. Journ.* vii.

124).

<sup>5</sup> *Mart. Fl. Bras. Malpigh.* 26.—B. H. *Gen.* 253, n. 11.

<sup>6</sup> “Red.”

<sup>7</sup> Spec. 1. *C. verrucosa* GRISEB. *loc. cit.*—WALP. *Ann.* vii. 469.

<sup>8</sup> *Malpigh.* 88, t. 9.—B. H. *Gen.* 254, n. 16.

<sup>9</sup> Germen single, 3-locular, according to most authors, but carpels certainly not connate.

flowers<sup>1</sup> in terminal slender oftener nutant racemes; peduncles and pedicels articulate, 2-bracteolate. (*Mexico*.<sup>2</sup>)

6. **Heladena** A. JUSS.<sup>3</sup>—Flowers nearly of *Echinopterys*; glands of calyx 8, stipitate peltate. Stamens 10, at base 1-adelphous; anthers inappendiculate glabrous or puberulous. Germen 3-gonal, 3-locular; styles 3, unequal in length, agglutinate to each other, finally solute, dilately truncate at stigmatose apex. Fruit 1-3 carpels, longitudinally cristate at back, indehiscent.—Shrubs; leaves opposite, often glandulose-dentate at base; stipules subulate; flowers<sup>4</sup> in axillary or terminal ramose racemes; pedicels articulate, 2-bracteolate.<sup>5</sup> (*South Brazil*.<sup>6</sup>)

7. **Galphimia** CAV.<sup>7</sup>—Calyx mostly eglandulose. Petals generally equal unguiculate, imbricate. Stamens 10; filaments free or connate at base, glabrous or more rarely (*Blepharandra*<sup>8</sup>) densely villose; anthers introrse inappendiculate, glabrous or more rarely (*Blepharandra*) barbate at margin and incrassate at back. Germen 3-locular; styles 3, free subulate stigmatose to acute apex. Capsule 3-cocceous; cocci dehiscent 1-spermous; testa of subglobose seed crustaceous; cotyledons of exalbuminous embryo inflexed or incurved round fold of testa incumbent, equal or unequal; radicle rather long.—Trees, shrubs, or sometimes under-shrubs; leaves opposite eglandulose or oftener glandulose from sometimes dentate or crenate margin to the top of the petiole; stipules axillary, small or rather large, free or connate in pairs; flowers<sup>9</sup> in terminal racemes; pedicels articulate at base bracteate and 2-bracteolate. (*Both Americas tropical and subtropical*.<sup>10</sup>)

8. **Thryallis** MART.<sup>11</sup>—Calyx eglandulose, often subglobose in bud;

<sup>1</sup> Yellow.

<sup>2</sup> Spec. 1. *E. Lappula* A. JUSS. loc. cit.—WALP. Rep. v. 194.—*Buichosia eglandulosa* A. JUSS. Syn. Malpigh.

<sup>3</sup> Malpigh. 93, t. 10.—ENDL. Gen. n. 5586<sup>1</sup> (*Heladenia*).—B. H. Gen. 253, n. 12.

<sup>4</sup> Small, white or golden.

<sup>5</sup> A genus very near *Echinopterys*, from which it differs chiefly in its plurilocular germen.

<sup>6</sup> Spec. about 4. WALP. Rep. v. 197.

<sup>7</sup> Icon. v. 61, t. 489.—A. JUSS. Malpigh. 67, t. 7.—DC. Prodr. i. 582.—SPACH, Suit. à Buffon, iii. 134.—ENDL. Gen. n. 5590.—B. H. Gen. 254,

n. 14.—A. GRAY, Gen. III. t. 173.—H. BN. Payer Fam. Nat. 310.—*Thryallis*, L. Gen. n., 533 (not MART.).

<sup>8</sup> GRISEB. *Linnaea*, xxii. 7.—B. H. Gen. 254, n. 15.

<sup>9</sup> Golden or ruddy.

<sup>10</sup> Spec. 10-12. H. B. K. Nov. Gen. et Spec. v. 172, t. 452.—A. JUSS. A. S. H. Fl. Bras. Mer. iii. 70, t. 178.—GRISEB. *Linnaea*, xiii. 259; in Mart. Fl. Bras. Malpigh. 28; Fl. Brit. W.-Ind. 115 —WALP. Rep. v. 182; Ann. vii. 469.

<sup>11</sup> Nov. Gen. et Spec. iii. 78, t. 230, 231

lobes finally accrete patent. Petals fimbriate, shortly unguiculate. Stamens 10; filaments 1-adelphous at base; anthers inappendiculate glabrous. Germen 3-locular, often 3-fid at apex; branches of style free, obliquely capitate at stigmatose apex. Fruit girt at base with accrete calyx; cocci 3, dorsally costate; testa of ovoid seed glabrous; cotyledons of exalbuminous embryo recurved incumbent.—Climbing shrubs, stellately pubescent; leaves opposite; petiole 2-glandulous; flowers<sup>1</sup> in corymbiform compound cymiferous terminal and axillary racemes; pedicels 2-bracteolate at the joint. (*Brazil*.<sup>2</sup>)

9. **Lasiocarpus** LIEBM.<sup>3</sup>—"Calyx eglandulose, villose with flexuose hairs. Petals 5, unguiculate. Stamens 10, 1-adelphous at base; anthers inappendiculate. Germen sericeo-lappulaceous, 3-locular; styles 3, free filiform, contorted at stigmatose 2-fid apex. Fruit globose covered with long (purple) and short branched hairs; carpels finally solute from axis; pericarp membranous; testa of suborbiculate seeds hairy; cotyledons of exalbuminous embryo foliaceous curved; radicle straight superior.—An erect shrub; leaves opposite entire sericeous; stipules scarious; flowers (small) fasciculate; peduncles sericeous; bracts scarious."<sup>4</sup> (*Mexico*.<sup>5</sup>)

10. **Spachea** A. JUSS.<sup>6</sup>—Calyx 8-10-glandulose. Petals glabrous unguiculate. Stamens 10 (of which 1-6 are sterile or sometimes rudimentary); filaments hirsute, 1-adelphous at base; anthers inappendiculate glabrous. Germen 2-3-locular; branches of style 2, 3, free, obtuse at stigmatose apex. Capsule 2-3-coccous, indehiscant or finally loculicidal; seeds subglobose.—Small glabrous or sericeous trees; leaves opposite, punctulate or glandulose beneath; stipules axillary connate in pairs; flowers<sup>8</sup> in terminal suberect racemes;

(not L.).—A. JUSS. *Malpigh.* 96, t. 10.—ENDL. *Gen.* n. 5583.—B. H. *Gen.* 254, n. 13.

<sup>1</sup> Yellow.

<sup>2</sup> Spec. about 3. VELLOZ. *Fl. Flum.* 193; iv. t. 168 (*Banisteria*).—LINDL. *Bot. Reg.* t. 1162.—GRISER. *Mart. Fl. Bras. Malpigh.* 33.—WALP. *Rep.* v. 198; *Ann.* iv. 273; vii. 469.

<sup>3</sup> *Vidensk. Meddel. Kjöben.* (1853), 90.—B. H. *Gen.* 255, n. 47.

<sup>4</sup> A genus unknown to us, "manifestly anomalous, whether (from axis of carpels) to

be referred to *Banisteria*?" (B. H. *loc. cit.*) "The grey sericeous twigs and fruit, from the size of its berry, of *Piper nigrum*."

<sup>5</sup> Spec. 1. *L. salicifolius* LIEBM. *loc. cit.*—WALP. *Ann.* ix. 372.

<sup>6</sup> *Malpigh.* 71, t. 8.—ENDL. *Gen.* n. 5591.—B. H. *Gen.* 255, n. 18.—*Meckelia* MART. ex GRISER. *Fl. Bras. Malpigh.* 25.

<sup>7</sup> Cells in *Meckelia* 3.

<sup>8</sup> Small, rosy or fleshy.

bracts 1-3-floral, often glandulose; pedicels articulate, 2-bracteolate. (*Antilles, warm South America*.<sup>1</sup>)

11. **Lophanthera** A. Juss.<sup>2</sup>—Calyx 10-glandulose. Petals unguiculate. Stamens 10; filaments free connate at base, glabrous or hirsute; anthers glabrous; cells cristato-alate. Germen 3-locular; branches of style free acute. Cocci of capsule 3, each continuous at base with a hollow swollen stipes, tardily dehiscent; seeds subglobose; testa membranous or crustaceous; cotyledons of inflexed embryo complanate. Other characters of *Spachea*.—Trees; leaves opposite entire papyraceous; petiole glabrous or 2-glandulose; stipules axillary connate in pairs; flowers<sup>3</sup> in compound cymiferous racemes; pedicels 1-3-floral; bract lateral; bracteoles oftener glanduliferous or glanduliform. (*Guiana, North Brazil*.<sup>4</sup>)

12. **Verrucularia** A. Juss.<sup>5</sup>—Flowers nearly of *Lophanthera*; sepals 5, thickly 2-glandulose externally at base. Petals unguiculate, imbricate; limbs unequal. Stamens 10; filaments dilately 1-adelphous at base; anthers introrse; cells each bearing at the margin a little below the apex a verruculose glandule. Germen and styles of *Lophanthera*. Cocci of capsule 3, dehiscent; seeds subglobose; cotyledons of embryo bent round the fold of crustaceous testa oblong. —An erect shrub; leaves opposite entire coriaceous glabrous glaucescent; stipules by pairs in 2 axillary 2-partite laminæ, confluent with sheath at base, connate; flowers<sup>6</sup> in terminal cymiferous racemes; pedicels articulate, at base 1, 2-bracteolate. (*Brazil*.<sup>7</sup>)

13. **Malpighia** L.<sup>8</sup>—Flowers nearly of *Galphimia*; calyx 5-10-glandulose. Petals unguiculate glabrous; limb denticulate, sometimes carinate, imbricate. Stamens 10, 2-seriate; filaments glabrous; 1-adelphous at base; anthers introrse

<sup>1</sup> Spec. about 6. DELESS.  *Ic. Sel.* iii, 19, t. 31. —GRISEB.  *Fl. Brit. W.-Ind.* 116. —WALP.  *Rep.* v. 187;  *Ann.* ii. 199;  *Ann.* vii. 469.

<sup>2</sup>  *Malpigh.* 61, t. 6. —ENDL.  *Gen.* n. 5588<sup>3</sup>. —B. H.  *Gen.* 255, n. 19.

<sup>3</sup> Yellow.

<sup>4</sup> Spec. 2. H. B. K.  *Nov. Gen. et Spec.* v. 173 ( *Galphimia*). —GRISEB.  *Mart. Fl. Bras. Malpigh.* 25. —WALP.  *Rep.* v. 179;  *Ann.* vii. 469.

<sup>5</sup>  *Malpigh.* 65, t. 7. —ENDL.  *Gen.* n. 5589<sup>1</sup>. —B. H.  *Gen.* 255, n. 20.

<sup>6</sup> Yellow.

<sup>7</sup> Spec. 1.  *V. glaucophylla* A. Juss.  *loc. cit.* —GRISEB.  *Mart. Fl. Bras. Malpigh.* 27. —WALP.  *Rep.* v. 182;  *Ann.* vii. 469. — *Banisteria glauca* MART. (ex MOHL).

<sup>8</sup>  *Gen.* n. 572 (part.). —ADANS.  *Fam. des Pl.* ii. 388. —J.  *Gen.* 253;  *Ann. Mus.* xviii. 480. —LAME.  *Ill.* t. 381. —POIR.  *Dict.* iv. 325;  *Suppl.* iv. 5. —DC.  *Prodr.* i. 577. —TURP.  *Dict. Sc. Nat.* Atl. t. 164. —A. Juss.  *Malpigh.* 4, t. 4. —SPACH,  *Suit. à Buffon*, iii. 124. —ENDL.  *Gen.* n. 5585. —PAYER,  *Organog.* 145, t. 23. —B. H.  *Gen.* 251, n. 2. —H. BN.  *Payer Fam. Nat.* 311.

glabrous.<sup>1</sup> Germen glabrous, 3-locular; branches of style 3, free, truncate at stigmatose apex. Fruit drupaceous; pyrenæ 1-3, scarcely cohering, unequally 3-5-alate or cristate at back. Embryo of oblong or ovoid seed exalbuminous straight; cotyledons fleshy plano-convex; radicle superior short.—Small trees or shrubs, glabrous or tomentose; the hairs<sup>2</sup> sometimes stinging when pressed; leaves opposite; petiole short; stipules small vanishing; limb entire or spinosely dentate; flowers<sup>3</sup> solitary or oftener in axillary and terminal, corymbiform or umbelliform cymes. (*Warm America*.<sup>4</sup>)

14. *Byrsonima* L. C. RICH.<sup>5</sup>—Flowers nearly of *Malpighia*; calyx 10-glandulous. Petals unguiculate glabrous. Stamens 10; filaments barbate, 1-adelphous or free. Gynæceum of *Malpighia*; branches of style acute at stigmatose apex. A drupe; putamen 1-3-locular. Other characters of *Malpighia*.—Trees or shrubs, sometimes climbing; leaves opposite entire; stipules free or connate in pairs; flowers in terminal racemes. (*Tropical America*.<sup>6</sup>)

15? *Bunchosia* L. C. RICH.<sup>7</sup>—Flowers nearly of *Malpighia* (or *Byrsonima*). Germen 2-3-locular; branches of style more or less deeply coalite, truncate at stigmatose apex. Drupe 1-3-pyrenous; pyrenæ ecristate nude. Remaining characters of *Byrsonima*.—Trees and shrubs, often scabrous;<sup>8</sup> leaves opposite entire petiolate;<sup>9</sup> stipules short, sometimes connivent in pairs; flowers<sup>10</sup> in axillary racemes opposite oftener glanduliferous bracteate. (*Warm America*.<sup>11</sup>)

<sup>1</sup> Concerning the pollen of the genus and of all the *Malpighiaceæ*, exceedingly variable in form, see H. MOHL, *Ann. Sc. Nat. sér. 2*, iii. 236.

<sup>2</sup> So called *Malpighiaceæ*.

<sup>3</sup> White, rosy or red.

<sup>4</sup> Spec. about 20. H. B. K. *Nov. Gen. et Spec.* v. 145.—GRISEB. *Fl. Brit. W.-Ind.* 116; *Mart. Fl. Bras. Malpigh.* 31.—TR. et PL. *Ann. Sc. Nat. sér. 5*, xviii. 307.—*Bot. Rep.* t. 96, 189, 568.—*Bot. Mag.* t. 813.—WALP. *Rep.* v. 150; *Ann.* i. 130; ii. 195; iv. 373; vii. 467.

<sup>5</sup> J. *Ann. Mus.* xviii. 481.—DC. *Prodr.* i. 579.—A. JUSS. *Malpigh.* 17, t. 5.—SPACH, *Suit. à Buffon*, iii. 128.—ENDL. *Gen.* n. 5592.—B. H. *Gen.* 251, n. 1.

<sup>6</sup> Spec. about 80. CAV. *Diss.* t. 237, 240, 241 (*Malpighia*).—AUBL. *Guian.* t. 181-184 (*Malpighia*).—H. B. K. *Nov. Gen. et Spec.* v. 147, t. 446-449.—GRISEB. *Linnaea*, xiii. 250; *Fl. Brit.*

*W.-Ind.* 114; *Mart. Fl. Bras. Malpigh.* 4, t. 1-4.—WALP. *Rep.* v. 156; *Ann.* ii. 195; vii. 466.

<sup>7</sup> J. *Ann. Mus.* xviii. 481.—A. JUSS. *Malpigh.* 76, t. 8.—DC. *Prodr.* i. 581.—SPACH, *Suit. à Buffon*, iii. 131.—ENDL. *Gen.* n. 5586.—B. H. *Gen.* 252, n. 3.—H. BN. *Payer Fam. Nat.* 311.—*Malacmea* GRISEB. *Linnaea*, xiii. 248.

<sup>8</sup> From somewhat prominent lenticular glands.

<sup>9</sup> With very many axillary leaf buds.

<sup>10</sup> White or yellow.

<sup>11</sup> Spec. about 20. JACQ. *Amer.* t. 177; *Hort. Schænbr.* t. 104; *Fragm.* t. 83;  *Ic. Rar.* t. 469 (*Malpighia*).—CAV. *Diss.* t. 238, 239 (*Malpighia*).—H. B. K. *Nov. Gen. et Spec.* v. 153.—TURCZ. *Bull. Mosc.* (1859), i. 266.—GRISEB. *Fl. Brit. W.-Ind.* 115; *Mart. Fl. Bras. Malpigh.* 30.—WALP. *Rep.* v. 159; *Ann.* i. 130; ii. 199; vii. 467.

16 ? **Glandonia** GRISEB.<sup>1</sup>—Flowers nearly of *Bunchosia* (or *Byrsosima*); calyx 10-glandulose. Stamens 10, 1-adelphous glabrous; cells of glabrous anther appendiculate with tuft. Germen 3-locular; branches of style free acute. A 1-locular oblong-conical somewhat terete coriaceous nut, longitudinally striated, indehiscent (?), 1-spermous; “testa of oblong seed membranous; cotyledons of exalbuminous embryo conferruminate or one abortive.”—A small tree;<sup>2</sup> younger twigs complanate; leaves opposite ample entire; stipules axillary elongate, caducous; flowers in terminal racemes; bracts 1–3-florous; bractlets often glandulose. (*Northern Brazil*.<sup>3</sup>)

17. **Diacidia** GRISEB.<sup>4</sup>—Flowers nearly of *Bunchosia*; calyx 10-glandulose. Petals glabrous unguiculate. Stamens 10, inserted on pilose receptacle; anthers 2-aristate at apex. Germen 2–3-locular; branches of style subfree acute. A 2–3-locular nut, externally corrugate; cotyledons of exalbuminous embryo longitudinally inflexed.—Sericeous shrubs; leaves opposite entire eglandulose; stipules adnate to petiole; flowers<sup>5</sup> in erect terminal loose compound racemes; peduncles and pedicels many times articulated. (*Guiana, Columbia*.<sup>6</sup>)

18. **Dicella** GRISEB.<sup>7</sup>—Flowers nearly of *Bunchosia*; calyx 6–8-glandulose, accrescent after floration. Petals 5, unequal. Stamens 10; filaments connate and hirsute at base; anthers pilose. Germen 2-locular; branches of style free, at apex uncinately dilate truncate stigmatose. Nut large, externally longitudinally cristulately-costate, clothed at base with accrete calyx, 1-spermous, indehiscent; embryo of subglobose seed thick exalbuminous; cotyledons subhemispherical. —Climbing shrubs; leaves opposite entire; flowers<sup>8</sup> in corymbiform axillary 3-photomous cymes; bracts and bractlets foliaceous suborbicularly concave involuerant in the bud?<sup>9</sup> (*Brazil*.<sup>10</sup>)

19. **Burdachia** A. JUSS.<sup>11</sup>—Flowers nearly of *Bunchosia* (or *Dicella*); calyx 10-glandulose. Petals 5, unequal. Stamens 10;

<sup>1</sup> Mart. Fl. Bras. Malpigh. 23.—B. H. Gen. 152, n. 5.

<sup>2</sup> Habit of *Colcostachis*.

<sup>3</sup> Spec. 1. *G. macrocarpa* GRISEB. loc. cit. 24.—WALP. Ann. vii. 468.—*Burdachia macrocarpa* BENTH.

<sup>4</sup> Mart. Fl. Bras. Malpigh. 119, not.—B. H. Gen. 252, n. 7.

<sup>5</sup> Sometimes abortive and reduced to a gland.

<sup>6</sup> Spec. 2. GRISEB. loc. cit.

<sup>7</sup> Linnaea, xiii. 250.—A. JUSS. Malpigh. 89, t. 9.—ENDL. Gen. n. 5587.—B. H. Gen. 252, n. 6.

<sup>8</sup> Yellow.

<sup>9</sup> As in *Thryallis*.

<sup>10</sup> Spec. about 3. A. JUSS. A. S. H. Fl. Bras. Mer. iii. 69, 177 (*Bunchosia*).—GRISEB. Mart. Fl. Bras. Malpigh. 32, t. 6.—WALP. Rep. v. 195; Ann. vii. 468.

<sup>11</sup> Malpigh. 57, t. 4.—ENDL. Gen. n. 5588.—B. H. Gen. 252, n. 4 (incl. *Corusia* MART.).

filaments glabrous, inserted in glabrous receptacle, 1-adelphous at base; anthers glabrous. Germen 3-locular; branches of style acute at apex. Nut 1-locular, pyramidal, scarcely dehiscent or finally opening at apex (*Euburdachia*<sup>1</sup>), or spheroidal-conical, closed at apex (*Curusia*<sup>2</sup>); embryo of exalbuminous seed thick; cotyledons unequal; one surrounding the other; radicle superior short.—Trees large or small; leaves opposite ample entire coriaceous, 2-glandulose at the base beneath to the costa; stipules axillary connate, deciduous; flowers in terminal 3-5-partite-ramose racemes; pedicels short; one bracteole glandulose. (*North Brazil*.<sup>3</sup>)

## II. BANISTERIÆ.

20. **Banisteria** L.—Flowers hermaphrodite; sepals 5; glandules of calyx 6-10, or more rarely 0. Petals 5, equal or unequal unguiculate, imbricate. Stamens 10, equal or unequal; filaments free or 1-adelphous at base; anthers introrse glabrous or pilose; connective scarcely produced or excrecent at back. Germen 3-lobed, 3-locular; lobes gibbous at back, often hirsute, 1-ovulate; branches of style 3, distinct, capitellate at stigmatose apex, finally truncate. Samaræ 1-3, indehiscent, dorsally produced to a vertical rigid venose wing thickened at upper margin, laterally nude or sometimes unequally cristate or muricate. Embryo of oblong seed exalbuminous straight, curved or inflexed.—Shrubs, often scandent; leaves opposite or sometimes 3-nate entire, often glandulose at base; petiole short; stipules free or connate in a ring, often deciduous; flowers in umbelliform cymes, oftener 4-florous, sometimes collected in a compound raceme; pedicels bracteate and 2-bracteolate. (*Tropical America*.) See p. 434.

21. **Peixotoa** Juss.<sup>4</sup>—Flowers nearly of *Banisteria*; calyx valvate 8-glandulose. Stamens 5 fertile oppositipetalous; 5 sterile alternate; filaments surmounted by thick glandules.<sup>5</sup> Gynæceum and fruit of *Banisteria*; dorsal wing confluent at base with unequal tufts of the

<sup>1</sup> *Burdachia* MART. MSS. (ENDL.).

<sup>2</sup> MART. *loc. cit.*

<sup>3</sup> SPEC. 2. GRISEB. *Mart. Fl. Bras. Malpigh.*

22.—WALP. *Rep.* v. 177; *Ann.* vii. 468

<sup>4</sup> *Fl. Bras. Mer.* iii. 60, t. 172; *Malpigh.*

174, t. 13.—ENDL. *Gen.* n. 5578.—B. H. *Gen.* 257, n. 30.

<sup>5</sup> “Connective excrecent.” Anthers glabrous inappendiculate.

sides.—Shrubs often scandent; leaves opposite, 2-glandulose at base; stipules interpetiolate large, 2-nately confluent; flowers<sup>1</sup> by fours in umbelliform panicles; the younger each enclosed by a bracteiform ample valvato-connivent stipule; pedicels below basal joint bracteate and 2-bracteolate. (*Brazil*.<sup>2</sup>)

22. **Ryssopterys** BL.<sup>3</sup>—Flowers (nearly of *Banisteria*) often 1-sexual; calyx eglandulose. Petals shortly unguiculate, stamens and gynæceum of *Banisteria*. Samaræ 1-3, laterally tuberculate; superior margin of dorsal wing thicker than the anterior.—Slender volubile shrubs; leaves opposite or sub-opposite entire, glanduliferous at margin beneath; petiole 2-glandulose to apex; stipules rather large; flowers<sup>4</sup> terminal or spuriously axillary in corymbiform cymes; pedicels articulate, incrassate to apex; bracts and bractlets 2 imbricate. (*Warm Oceania*.<sup>5</sup>)

23. **Brachypterys** A. Juss.<sup>6</sup>—Flowers nearly of *Banisteria*; calyx 8-glandulose. Stamens 10, most of which are sometimes anantherous. Branches of style produced to an unequally pediform lamina and stigmatose-subcapitate. Gynæceum and fruit nearly of *Banisteria*; cocci dorsally appendiculate with short vertical tuft.—Volubile shrubs; branches compressed; leaves opposite entire; petiole 2-glandulose at apex; stipules minute; flowers<sup>7</sup> in umbelliform or corymbiform cymes; pedicels articulate at base, bracteate and 2-bracteolate. (*Antilles, tropical America*.<sup>8</sup>)

24. **Stigmaphyllon** A. Juss.<sup>9</sup>—Flowers nearly of *Banisteria*; calyx 8-glandulose. Stamens 10, of which 6 are fertile; but the 4 alternipetalous are sterile or rudimentary, sometimes minutely petaloid; filaments glabrous, connate at base; anthers glabrous or exappendiculate or setiferous at apex. Germen and styles of *Brachypterys*; apex stigmatose unciform or unequally pediform more or less foliaceo-dilated. Samaræ 1-3 (nearly of *Banisteria*),

<sup>1</sup> Yellow.

<sup>2</sup> Spec. about 10. GRISEB. *Mart. Fl. Bras. Malpigh.* 55.—WALP. *Rep.* v. 249; *Ann.* vii. 473.

<sup>3</sup> A. Juss. *Malpigh.* 129, t. 11.—ENDL. *Gen.* n. 5580.—B. H. *Gen.* 257, n. 28.

<sup>4</sup> "Whitish."

<sup>5</sup> Spec. 6, 7. VENT. *Ch. de Pl.* t. 50.—DELESS  *Ic. Sc.* iii. t. 350.—TURCZ. *Bull. Mosc.* (1863). i. 583.—MIQ. *Fl. Ind.-Bat.* i. p. ii. 583.—WALP. *Rep.* v. 220; *Ann.* v. 220; vii. 472.

<sup>6</sup> *Malpigh.* 101, t. 12. ENDL. *Gen.* n. 5582.—

B. H. *Gen.* 256, n. 26.

<sup>7</sup> Yellow or golden.

<sup>8</sup> Spec. 2, 3. CAV. *Diss.* i. 257 (*Banisteria*).—VENT. *Ch. de Pl.* t. 51 (*Banisteria*).—DELESS. *Ic. Sc.* iii. 20, t. 34.—A. Juss. *A. S. H. Fl. Bras. Mer.* iii. 59 (*Stigmaphyllon*).—GRISEB. *Mart. Fl. Bras. Malpigh.* 35.—WALP. *Rep.* v. 201; *Ann.* vii. 471.

<sup>9</sup> A. S. H. *Fl. Bras. Mer.* iii. (part.). t. 170, 171; *Malpigh.* 103, t. 12.—SPACH, *Suit. à Buffon*, iii. 153.—ENDL. *Gen.* n. 5581.—B. H. *Gen.* 257, n. 27.



laterally often cristate; dorsal wing erect, the anterior margin thicker than the superior sometimes appendiculate. Other characters of *Banisteria*.—Scandent shrubs; leaves oftener opposite, entire, denticulate or sometimes lobate, 2-formed; petiole 2-glandulose; stipules small; flowers<sup>1</sup> in corymbiform or umbelliform cymes axillary to twigs terminal; pedicels articulate minutely bracteate and 2-bracteolate. (*Tropical America*.<sup>2</sup>)

25. **Heteropterys** H. B. K.<sup>3</sup>—Flowers nearly of *Banisteria*; calyx oftener 8-glandulose. Stamens 10, unequal, germen and styles of *Stigmaphyllon* (or *Brachypterys*). Samaræ 1–3; dorsal wing (of *Banisteria*) incrassate at inferior margin.—Shrubs, rarely scandent; leaves opposite, oftener entire and glanduliferous beneath; petiole short; flower in subsimple or more or less ramose compound racemes; pedicels articulate, 2-bracteolate.<sup>4</sup> (*Tropical and Southern extra-tropical America*.<sup>5</sup>)

26 ? **Henleophytum** KARST.<sup>6</sup>—“Calyx 5-partite; glandules 8, peltate stipitate. Petals 5, unguiculate. Stamens 10, 1-adelphous; anthers glabrous. Germen pubescent; branches of style capitate at stigmatose apex. Carpels (immature) exalate, dorsally rotundate, covered all over with soft hairs; seed...?—A tortuous glabrous shrub; leaves opposite entire eglandulose; flowers in slender axillary racemes; peduncles bracteate and 2-bracteolate above the base.”<sup>7</sup> (*Cuba*.)

27. **Lophopterys** A. Juss.<sup>7</sup>—Flowers nearly of *Banisteria*; calyx oftener 4-glandulose; glandules externally sub-basilar to middle of sepals ample radiately-lamellate. Stamens 10. Germen 5-lobed; carpels sub-distinct; branches of style subulate, obliquely truncate at stigmatose apex. Carpels of fruit 1–3, solute from axis, ligneous, shortly cristate at back to midrib, indehiscent. Other characters of

<sup>1</sup> Golden.

<sup>2</sup> Spec. about 40. DC. *Prodr.* i. 589 (*Banisteria*).—GRISEB. *Fl. Brit. W.-Ind.* 118; *Fl. Wright. Cub.* i. 168; in *Mart. Fl. Bras. Malpigh.* 36, t. 7.—WALP. *Rep.* v. 202; *Ann.* i. 130; ii. 200; iv. 372; vii. 471.

<sup>3</sup> *Nov. Gen. et Spec.* v. 163.—A. Juss. *Malpigh.* 180, t. 14.—SPACH, *Suit. à Buffon*, iii. 149.—ENDL. *Gen.* n. 5575.—B. H. *Gen.* 256, n. 22.

<sup>4</sup> A genus (with the following) distinguished from the preceding only by the form of its inflorescence; in flowers and fruit not different.

<sup>5</sup> Spec. about 75. GRISEB. *Linnaea*, viii. 217;

*Fl. Brit. W.-Ind.* 119; *Mart. Fl. Bras. Malpigh.* 57, t. 10–12.—REG. *Ind. Sem. Hort. Petrop.* (1858), 47.—WALP. *Rep.* v. 254; *Ann.* ii. 203; iv. 371; vii. 470.

<sup>6</sup> *Fl. Columb.* i. 158.—B. H. *Gen.* 256, n. 23.—HENLEA GRISEB. *Abh. Kæn. Ges. Götting.* (1860), 37.

<sup>7</sup> A variety not known to us; it seems a *Banisteria* with exalate softly setose fruit.

<sup>8</sup> *class. Ic. Sel.* iii. 18, t. 29; *Malpigh.* 99, t. 11.—ENDL. *Gen.* n. 5577.—B. H. *Gen.* 255, n. 21.

*Brachypterys* (or *Banisteria*).—A tree; leaves opposite ample oblong entire eglandulose, silky beneath; flowers<sup>1</sup> in terminal ramose compound racemes; sericeous branches and pedicels thick articulate bracteolate. (*Guiana*.<sup>2</sup>)

28? *Sphedamnocarpus* PL.<sup>3</sup>—Flowers nearly of *Banisteria*; calyx eglandulose. Petals 5, shortly unguiculate subentire. Stamens 10, glabrous. Carpels 3, hirsute, coalite at axis; branches of style 3, free filiform; apex stigmatose acute incurved. Samaræ 1–3, laterally inserted in pyramidal receptacle and finally solute from it, produced above to a dorsal wing.—Scandent shrubs; leaves opposite or sometimes 3–4-nately verticillate, entire exstipulate; petiole glandulose; flowers in umbelliform oftener terminal cymes, generally 4-florous; peduncles bracteolate at base and 2-bracteolate<sup>4</sup> at apex. (*Tropical Western and Southern Africa*.<sup>5</sup>)

29. *Acridocarpus* GUILL. and PERR.<sup>6</sup>—Flowers nearly of *Sphedamnocarpus*; calyx eglandulose or externally at base inconspicuously and unequally glandulose. Stamens 10; anthers often cordate-lanceolate glabrous. Germen 3-lobed; styles 3, of which 2 are oftener long filiform, circinate at acute stigmatose incurved apex; the third often short erect or inconspicuous. Samaræ 1–3, and other characters of *Sphedamnocarpus*; seeds often angular; cotyledons of curved embryo plano-convex.—Trees or shrubs, sometimes scandent; leaves opposite or generally alternate exstipulate, often glanduliferous beneath; flowers<sup>7</sup> in racemes or more rarely corymbs subsimple or ramose terminal and lateral; pedicels reflexed at apex, bracteate and 2-bracteolate. (*Tropical, south, continental and east insular Africa, Arabia, New Caledonia*.<sup>8</sup>)

30. *Tricomaria* HOOK. and ARN.<sup>9</sup>—Flowers nearly of *Banisteria*; calyx 8–10-glandulose. Petals unguiculate unequal. Stamens 10; anthers glabrous. Gynæceum of *Stigmaphyllon* or *Brachy-*

<sup>1</sup> Rather large (yellow?).

<sup>2</sup> Spec. 1. *L. splendens* A. JUSS. loc. cit.—WALP. Rep. v. 200.

<sup>3</sup> B. H. Gen. 256, 988, n. 25.

<sup>4</sup> Closely allied to *Acridocarpus*.

<sup>5</sup> Spec. 2, 3. A. JUSS. Malpigh. 236 (*Acridocarpus*, § 2).—HARV. and SOND. Fl. Cap. i. 232, n. 2, 3 (*Acridocarpus*).—OLIV. Fl. Trop. Afr. i. 280.—WALP. Rep. v. 288 (*Acridocarpus*, § 2).

<sup>6</sup> Fl. Seneg. Tent. i. 123, t. 29.—A. JUSS. Malpigh. 228 (part.), t. 15.—SPACH, Suit. à Buffon,

iii. 156.—ENDL. Gen. n. 5576.—B. H. Gen. 256, n. 24.—*Anomopteris* G. DON. Gen. Syst. i. 647.

<sup>7</sup> Golden, sometimes very odoriferous.

<sup>8</sup> SPEC. 12, 13. HOOK. F. Niger, 244, t. 24.—HARV. and SOND. Fl. Cap. i. 231, n. 1.—HARV. Thes. Cap. 12, t. 19.—OLIV. Fl. Trop. Afr. i. 277.—H. BN. Adansonia, xi. 248.—WALP. Rep. v. 285; Ann. i. 131; ii. 204; vii. 471.

<sup>9</sup> Bot. Misc. iii. 158, t. 101.—A. JUSS. Malpigh. 227, t. 15.—ENDL. Gen. n. 5584.—B. H. Gen. 258, n. 31.

*pterys*<sup>1</sup>). Fruit 3-lobed; lobes furnished at back with pencils of hairs; seed...?—A white silky shrub, twigs suberuciate virgate, sometimes subaphyllous; leaves opposite or subopposite, oftener very small lanceolate entire eglandulose; flowers<sup>2</sup> 1-3 at summit of twigs; pedicels articulate, 2-bracteolate. (*Western Andinian Plata*.<sup>3</sup>)

31? **Ptilochæta** TURCZ.<sup>4</sup>—"Calyx eglandulose, 5-partite. Petals...? Stamens 10; filaments capillary, 1-adelphous; anthers small glabrous inappendiculate. Germen 3-locular, silky at back with feathery hairs; styles 3, capillary flexuose, scarcely incrassate at oblique stigmatose apex. Lobes of fruit 1-3, long-plumose at back exalate;<sup>5</sup> seeds curved; cotyledons of uncinate embryo flat incumbent; radicle terete."—A soft-silky shrub; leaves opposite petiolate entire eglandulose; flowers axillary solitary or few; pedicels articulate.<sup>6</sup> (*Eastern Brazil*.<sup>7</sup>)

### III. HIRÆÆ.

32. **Hiræa** JACQ.—Flowers hermaphrodite; calyx 5-partite glandules 8-10, or 0. Petals 5, unguiculate reflexed, subentire or denticulate. Stamens 10 (of *Malpighia*), five of which are longer. Germen 3-lobed; branches of style free rigid, stigmatose at compressed apex. Samaræ 1-3, produced on both margins to semi-orbicular wings venose distinct or confluent at base and apex, at the back also shortly membranously cristate. Seeds exalbuminous; cotyledons of uncinate embryo thick fleshy, oftener very unequal; radicle exserted.—Shrubs oftener scandent; leaves opposite or more rarely alternate, entire eglandulose; stipules various in form and position or 0; flowers in small umbelliform cymes often 4-florous; cymes 3, 4-nate axillary; pedicels subsessile (*Euhiræa*) or (*Muscagnia*) in more or less ramose compound racemes terminal and axillary

<sup>1</sup> Styles not tubular (as said), but uncinate at pediform apex and those of *Stigmaphyllon* or *Brachypterys* quite reflexed.

<sup>2</sup> "Aurantiacis."

<sup>3</sup> Spec. 1. *T. Usillo* HOOK. and ARN. *loc. cit.*—WALP. *Rep.* v. 284.—*Banisteria Usillo* GILL.

<sup>4</sup> In *Bull. Mosc.* xvi. (1843), 52; in *Flora*,

xxvii. i. 120 (*Rosacea*).—B. H. *Gen.* 258, n. 32.

<sup>5</sup> Plumcs subradiately open.

<sup>6</sup> "A single genus, not perfectly known, but most certainly malpighiaceous and clearly referable to *Tricomaria*." (B.H.)

<sup>7</sup> Spec. 1. *P. bahiensis* TURCZ. *loc. cit.*—WALP. *Rep.* v. 655.

(pedicels not sessile); pedicels articulate bracteolate. (*Tropical America*.) See p. 438.

33. **Diplopterys** A. JUSS.<sup>1</sup>—Flowers nearly of *Hirca*; calyx 8-glandulose. Petals unguiculate not fimbriate. Stamens 10, glabrous; connective incrassate papillose. Germen 3-lobed; branches of style short, truncate at stigmatose apex. Samaræ 3, dorsally produced to thick ligneous wings or keels; dorsal wing crestlike; the two lateral confluent at base and apex. Other characters of *Hirca*.—A scandent shrub;<sup>2</sup> leaves opposite entire exstipulate; flowers<sup>3</sup> in spurious axillary short-umbels, 4-florous, often 2-nate; pedicels very short bracteate, 2-bracteolate. (*Guiana*.<sup>4</sup>)

34. **Tetrapteryx** CAV.<sup>5</sup>—Flowers nearly of *Hirca*; calyx 8-10-glandulose (or more rarely 0). Petals dentate or subintegrate. Stamens 10, five of which are longer; anthers glabrous or hirsute. Germen 3-lobed; branches of style truncate at stigmatose apex. Samaræ 1-3, produced at margins to 4 wings, cruciately divergent, more or less cristate at back. Other characters of *Hirca*.—Shrubs often scandent; leaves opposite entire eglandulose generally lucid stipulate; flowers<sup>6</sup> in terminal oftener very ramose compound-cymiferous racemes; pedicels articulate; bracts and bracteoles sometimes foliaceous. (*Tropical America*.<sup>7</sup>)

35. **Triopteryx** L.<sup>8</sup>—Calyx 8-glandulose. Petals unguiculate subentire. Stamens 10; anthers glabrous. Germen 3-lobed; branches of style short, truncate at stigmatose apex. Samaræ 1-3, 3-alate; the two superior wings, marginally ascendent, with the third inferior descendent confluent in one unequally-3-lobed finally membranous-subligneous; dorsal crests short (or 0). Other characters of *Hirca*.—Scandent shrubs; leaves opposite eglandulose glabrous

<sup>1</sup> Deless.  *Ic. Scil.* iii. 20, t. 33; *Malpigh.* 323, t. 20.—ENDL. *Gen.* n. 5567.—B. H. *Gen.* 260, n. 41.

<sup>2</sup> Becoming black as it dries.

<sup>3</sup> Golden.

<sup>4</sup> *Spec.* 1. *D. Paralias* A. JUSS. *loc. cit.*—WALP. *Rep.* v. 339.—*Hirca longifolia* RICH.—*H. mucronata* RICH. (A. JUSS.).

<sup>5</sup> *Diss.* 433, t. 260-262.—A. JUSS. *Malpigh.* 263, t. 18.—SPACH, *Suit. à Buffon*, iii. 142.—ENDL. *Gen.* n. 5574.—B. H. *Gen.* 260, n. 39.

<sup>6</sup> Golden or reddish.

<sup>7</sup> *Spec.* about 50. GERTN. *Fruet.* ii. 165, t.

116 (*Triopteryx*).—H. B. K. *Nov. Gen. et Spec.* v. 168.—A. JUSS. *A. S. H. Pl. Bras. Mer.* iii. 5, t. 161, 162.—TURCZ. *Bull. Mosc.* (1858), i. 394.—GRISEB. *Mart. Pl. Bras. Malpigh.* 75, t. 13-17.—TR. et PL. *Ann. Sc. Nat. sér. 5*, xviii. 332.—WALP. *Rep.* v. 300; *Ann.* ii. 204; iv. 371; vii. 474.

<sup>8</sup> *Gen.* n. 574.—J. *Gen.* 253.—LAMK. *Ill.* t. 382.—POIR. *Diet.* vii. 103 (part.).—DC. *Prodr.* i. 586.—A. JUSS. *Malpigh.* 260, t. 18.—SPACH, *Suit. à Buffon*, iii. 141.—ENDL. *Gen.* n. 5573.—B. H. *Gen.* 259, n. 38.

lucid venose exstipulate; flowers<sup>1</sup> in axillary and terminal more or less ramosely compound racemes; pedicels articulate bracteate and 2-bracteolate. (*Antilles, Mexico.*<sup>2</sup>)

36. **Aspidopterys** A. JUSS.<sup>3</sup>—Calyx eglandulose. Petals 5, sessile entire. Stamens 10, 1-adelphous at base; anthers glabrous ovate. Germen 3-lobed; branches of style glabrous, capitellate at stigmatose apex. Samaræ 1-3, furnished with shield-like ellipsoidal ovate or suborbiculate membranous wing, sometimes very shortly cristate at back. Other characters of *Hirca*.—Scandent shrubs; leaves opposite entire eglandulose exstipulate; flowers<sup>4</sup> in scantily or oftener richly ramosely compound cymiferous racemes, terminal or axillary; pedicels bracteolate. (*Tropical Asia.*<sup>5</sup>)

37. **Triaspis** BURCH.<sup>6</sup>—Calyx short eglandulose. Petals 5, unguiculate; limb long-fimbriate at base. Stamens 10; anthers glabrous. Germen 3-lobed; branches of style flexuose, stigmatose to subulate apex. Samaræ 1-3, winged at margin; more or less cristate at back with membranous venose wing. Other characters of *Hirca*.—Shrubs oftener scandent; leaves opposite or subopposite entire, minutely glandulose or eglandulose; stipules small or subfoliaceous; flowers<sup>7</sup> in umbelliform or corymbiform compound racemose cymes; pedicels rather long articulate ebracteolate. (*Tropical and South Africa.*<sup>8</sup>)

38. **Flabellaria** CAV.<sup>9</sup>—Calyx gamophyllous eglandulose, valvate, finally unequally divided into 2-4 laciniae. Petals narrow lanceolate sessile entire glabrous, subequal to calyx. Stamens 10; filaments free filiform; anthers oblong introrse glabrous. Germen hirsute, 3-lobed; branches of style 3, free subulate incurved, circinate in bud, stigmatose within at apex. Samaræ 1-3, produced at margins to wide semiorbicular wings connate at base and apex, at back to a short wing confluent with the marginal ones; testa of ovoid seed membranous; cotyledons of exalbuminous embryo ovate, convolutedly

<sup>1</sup> Azure or violet.

<sup>2</sup> Spec. 2, 3. JACQ. *Obs.* iii. 7, t. 56 (*Banisteria*).—CAV. *Diss.* 433, t. 260, 262.—H. B. K. *Nov. Gen. et Spec.* v. 167, t. 451.—GRISEB. *Fl. Brit. W.-Ind.* 120.—WALP. *Rep.* v. 299.

<sup>3</sup> *Malpigh.* 254, t. 17.—ENDL. *Gen.* n. 5570.—B. H. *Gen.* 259, n. 37.

<sup>4</sup> White or yellow.

<sup>5</sup> Spec. about 15. ROXB. *Pl. Coromand.* ii. 32, t. 160 (*Triopteris*); *Hort. Calc.* 90; *Fl. Ind.* ii. 447 (*Hirca*).—BL. *Bijdr.* 225 (*Hirca*).—WALL. *Pl. As. Rar.* t. 13.—HOOK. F. and VOL. V.

THOMS. *Fl. Brit. Ind.* i. 419.—WALP. *Rep.* v. 297; *Ann.* vii. 473.

<sup>6</sup> *Trav.* ii. 280, fig. 290.—A. JUSS. *Deless. Ic. Sel.* iii. 21, t. 36; *Malpigh.* 250, t. 17 (part.).—ENDL. *Gen.* n. 5569 (part.).—B. H. *Gen.* 259, n. 35.

<sup>7</sup> White or rosy.

<sup>8</sup> Spec. 6. W. *Spec.* ii. 743 (*Hirca*).—SCHUM. and THÖNN. *Beskr.* 243 (*Hirca*).—HARV. and SOND. *Fl. Cap.* i. 232.—OLIV. *Fl. Trop. Afr.* i. 280.—WALP. *Rep.* v. 295.

<sup>9</sup> *Diss.* 436, t. 264.—B. H. *Gen.* 259, n. 35.

plicate below.—A scandent shrub; leaves opposite ample entire, sericeous beneath, exstipulate; petiole glandulose; flowers<sup>1</sup> in full ramose compound cymiferous racemes; cymules umbelliform, often 4-florous; pedicels long articulate, bracteate at base; bracteoles 2. (*Tropical western Africa*.<sup>2</sup>)

39. **Jubelina** A. Juss.<sup>3</sup>—Calyx 5-partite; laciniae externally at base thickly 1-glandulose. Petals 5, unguiculate denticulate. Stamens 10; filaments 1-adelphous at base; anthers glabrous. Germen 3-lobed; branches of style 3, 2-lobed at truncate stigmatose apex. Samaræ 1-3, membranous inflated, externally produced to short parallel undulate sinuate leaves; within spuriously 3-locular; lateral cellules empty;<sup>4</sup> the intermediate 1-spermous; testa of long compressed seed membranous; cotyledons of exalbuminous embryo straight; radicle short superior.—A scandent shrub; leaves opposite ample entire coriaceous petiolate, glandulose beneath; stipules minute; flowers<sup>5</sup> in ramose racemes formed of umbelliform cymules oftener 3-nate; bracts and bracteoles surrounding the cymules. (*Guiana, Nicaragua*.)

40. **Hiptage** GÆRTN.<sup>7</sup>—Calyx 5-partite; lacinia 1 furnished externally at the middle of the base with a wide glandule adnate to the pedicel. Petals 5, unequal, sericeous unguiculate. Stamens 10, declinate, of which 9 are smaller; the tenth much longer than the others; filaments of all 1-adelphous at base; anthers of all fertile. Germen 3-lobed; style 1, or more rarely 2, circinate in bud, afterwards straight or curved with stigmatose capitellate apex, finally truncate; one larger. Samaræ 1-3, unequally-3-alate; the 2 lateral expanded, transverse or subdescendent; the third superior ascendent. Seed subglobose; embryo exalbuminous curved.—Scandent shrubs; leaves opposite entire coriaceous eglandulose; flowers<sup>8</sup> in axillary and terminal simple or ramose racemes; pedicels articulate, 2-bracteolate. (*Tropical Asia, Indian Archipelago*.)

<sup>1</sup> Small, white.

<sup>2</sup> Spec. 1. *F. paniculata* CAV. loc. cit.—OLIV. *Fl. Trop. Afr.* i. 282.—*Triaspis Flabellaria* A. Juss. *Malpigh.* 253, t. 17, n. 26, SE.—WALP. *Rep.* v. 296, n. 4.—*Hirca pinnata* W. Spec. ii. 743.—*Triopteris odorata* POIR. *Diet.* viii. 108, n. 13.

<sup>3</sup> *Deless. Ic. Sel.* iii. 19, t. 32; *Malpigh.* 325, t. 20.—ENDL. *Gen.* n. 5566.—B. H. *Gen.* 260, n. 42.

Spurious and out of form the exocarp being free from the endocarp on both sides.

<sup>5</sup> "Purple."

<sup>6</sup> Spec. 3. WALP. *Rep.* v. 340; *Ann.* iv. 370.

<sup>7</sup> *Fruct.* ii. 69, t. 116.—DC. *Prodr.* i. 583.—A. Juss. *Malpigh.* 246, t. 16.—SPACH, *Suit. à Buffon*, iii. 138.—ENDL. *Gen.* n. 5572.—B. H. *Gen.* 258, n. 34.—BAKER, *Fl. Maurit.* 35.—GÆRTNERA SCHREB. *Gen.* i. 290 (not RETZ. nor LAMK.).—MOLINA CAV. *Diss.* 435, t. 263 (not R. et PAV. nor LESS. nor C. GAY).—*Madablota* SONNER. *Voy.* ii. 135.—*Succowia* DENNST. *Comm.* vi. 59 (not MEDIK.).

<sup>8</sup> Odorous, white; fifth petal different in colour.

<sup>9</sup> Spec. 3, 4. ROXB. *Pl. Corom.* 19, t. 18

41. **Tristellateia** DUP.-TH.<sup>1</sup>—Calyx 5-partite; glandules 0 or very small. Petals 5, unguiculate glabrous. Stamens 10; filaments incurved, 1-adelphous at base, persistent; anthers oblong glabrous. Germen 3-lobed; branches of style 3, of which 1 or 2 are oftener rudimentary; the third elongate. Samaræ 1-3, inserted laterally to central conical column; the edges produced to narrow irregular and oftener unequally incised wings; the back shortly unequally cristate; testa of oblong or obovoid seed membranous; cotyledons of fleshy embryo uncinate.—Shrubs, oftener scandent; leaves opposite or verticillate entire; petioles often 2-glandulose to apex; stipules very small or laciniate; flowers<sup>3</sup> in simple or more or less ramose compound cymiferous racemes; bracteoles setaceous. (*Malacca, Indian Archipelago, tropical Oceania.*)<sup>3</sup>

42. **Dinemandra** A. JUSS.<sup>4</sup>—Calyx deeply 5-fid, glandules to 6, long-stipitate. Petals unguiculate unequal. Stamens to 10, of which 2 or 3 are fertile, the others anantherous; filaments unequal, 1-adelphous at base; anthers linear oblong. Germen 3-lobed; lobes cristate; styles 1-3, unequal truncate. Samaræ 1-3, small, membranously alate at both edges, cristately alate at back; testa of ovoid seed membranous; cotyledons of exalbuminous spiral embryo linear; radicle elongate.—Ramoso cricoideal undershrubs; leaves narrow, revolute at margin; flowers<sup>5</sup> in cymes oftener few-flowered terminal or approaching a raceme, 2-bracteolate. (*Peru, Chili.*)<sup>6</sup>

43? **Dinemagonum** A. JUSS.<sup>7</sup>—Flowers nearly of *Dinemandra*. Stamens 10, of which 2 are anantherous; gynæceum and other characters of *Dinemandra*. Samaræ 1-3, alate at back and cristulate on both sides.—Ramoso undershrubs; leaves opposite small entire flat; flowers<sup>8</sup> few in terminal racemes.<sup>9</sup> (*Chili.*)<sup>10</sup>

(*Gærtnera*).—WIGHT, *Ill.* t. 50.—MIQ. *Fl. Ind.-Bat.* Suppl. i. 512.—HOOK. F. and THOMS. *Fl. Brit. Ind.* i. 418.—WALP. *Rep.* v. 293; *Ann.* iv. 371; vii. 473.

<sup>1</sup> *Gen. Nov. Madag.* 47.—A. JUSS. *Malpigh.* 240, t. 16.—DC. *Prodr.* i. 583.—ENDL. *Gen.* n. 5571.—B. H. *Gen.* 258, n. 33.—ZYMUN NORONH. —DUP.-TH. *Hist. Vég. Iles. Afr. Austr.* 6, t. 23. —*Platynema* WIGHT and ARN. in *Edinb. New Phil. Journ.* (Jul. 1833), 179; *Prodr.* i. 107.

<sup>2</sup> Golden.

<sup>3</sup> Spec. about 12. A. RICH. *Voy. Astrol. Bot.* 38, t. 15.—ARN. *Hook. Kew Journ.* iii. 59.—H.

BN. *Adansonia*, xi. 249.—WALP. *Rep.* v. 290.

<sup>4</sup> *Malpigh.* 328, t. 19.—ENDL. *Gen.* n. 5565.

—B. H. *Gen.* 261, n. 43.

<sup>5</sup> Golden.

<sup>6</sup> Spec. 1, 2. GAUDICH. *Voy. Bonite, Bot.* t. 11.

—C. GAY, *Fl. Chil.* i. 357, t. 9.—WALP. *Rep.* v. 341; *Ann.* i. 131.

<sup>7</sup> *Malpigh.* 331.—B. H. *Gen.* 261, n. 44.

<sup>8</sup> Golden.

<sup>9</sup> May not this be a section of the preceding genus?

<sup>10</sup> Spec. 1, 2. C. GAY, *Fl. Chil.* i. 359.—WALP. *Rep.* v. 342; *Ann.* i. 131.

## IV. GAUDICHAUDIEÆ.

44. **Schwannia** ENDL.—Flowers hermaphrodite; calyx deeply 5-fid or 5-partite; glandules oftener 8. Petals 5, unguiculate fimbriate, imbricate. Stamens 6, fertile, unequal; filaments glabrous, 1-adelphous at base or in part free; anthers introrse pilose. Carpels of gynæceum 3; germens free; style gynobasic 1 (or sometimes 2, 3), at apex stigmatose capitellate; ovule in cells 1, descendent, incompletely anatropous. Samaræ 1-3, each subtending a filiform finally separable column; hilum of curved seed ventral; cotyledons of exalbuminous embryo oblong; radicle rostrate.—Scandent shrubs; leaves opposite entire eglandulose petiolate; flowers in cymes often 4-florous and collected in terminal compound-ramose racemes; pedicels 2-bracteolate. (*Tropical Brazil*.) See p. 441.

45 ? **Janusia** A. JUSS.<sup>1</sup>—Flowers 2-morphous; the normal nearly of *Schwannia*; petals subentire. Stamens 6, either all fertile, or sometimes more sterile; anthers glabrous.<sup>2</sup> Samaræ 1-3 and other characters of *Schwannia*. Flowers abnormal in eglandulose calyx. Petals oftener rudimentary. Carpels 2; styles rudimentary or 0.—Shrubs or undershrubs, generally scandent; leaves opposite entire; flowers<sup>3</sup> in axillary and terminal, often 3, 4-flowered (spurious) umbels; pedicels 2-bracteolate. (*Extra-tropical Brazil, warm northern and western America*.)<sup>4</sup>

46. **Camarea** A. S. H.<sup>5</sup>—Flowers 2-morphous; the normal nearly of *Janusia*; stamens 6, of which 5 are alternipetalous; 4 fertile; 2 sterile; filaments glabrous, 2-adelphous (of which 3 are highly connate, but 3 only at the base); anthers of fertile flowers short, 2-locular; of the sterile deformed to a glandulose subcapitate-contortuplicate mass. Carpels 2-4 free; style gynobasic (of *Schwannia*). Nuts 1-4, furnished with a short dorsal wing or oftener seriatly echinate, muricate or lappulaceous. Abnormal flowers apetalous; calyx eglandulose; anther rudimentary 1. Carpels 2 (of *Janusia*).—Shrubs

<sup>1</sup> *Malpigh.* 349, t. 21.—ENDL. *Gen.* n. 5562.—B. H. *Gen.* 262, n. 48.

<sup>2</sup> Filaments glabrous, connate at base.

<sup>3</sup> Yellow; from abnormal axils subumbellate (very small).

<sup>4</sup> Spec. 3, 4. A. S. H. *Pl. Rem. Brés.* 159, t. 19; *Fl. Bras. Mer.* iii. 165, t. 174 (*Gaudichaudia*).—GRISEB. *Mart. Fl. Bras. Malpigh.*

103, n. 1-3, 5.—WALP. *Rep.* v. 351; *Ann.* iv. 369; vii. 476.

<sup>5</sup> *Bull. Soc. Philom.* (1823), 133; *Pl. Rem. Brés.* 155, t. 18; *Fl. Bras. Mer.* iii. 66, t. 175, 176.—A. JUSS. *Malpigh.* 345, t. 22.—SPACH, *Suit. à Buffon*, iii. 136.—ENDL. *Gen.* n. 5561.—B. H. *Gen.* 261, n. 47.—H. BN. *Payer Fam. Nat.* 312.



or undershrubs, scandent or erect; leaves subalternate or 3-nate, oftener opposite entire, generally small narrow or subericoid; flowers<sup>1</sup> terminal and axillary, as in *Janusia*; peduncles long. (*Southern Brazil*.<sup>2</sup>)

47. **Aspicarpa** LAGASC.<sup>3</sup>—Flowers 2-morphous; normal calyx 10-glandulose. Petals fimbriate. Stamens 5, of which 2 are fertile, higher connate; 3 sterile, connate only at base, presenting deformed anthers or partly or wholly anantherous. Carpels 3. Calyx of abnormal (very small) apetalous flowers eglandulose. Anther 1, rudimentary. Germens 2; style rudimentary or 0. A solitary irregular pyramidal 3-gonal nut, furnished at back with from 1-3 (or 0) tufts; embryo curved exalbuminous.—Erect slender shrubs; twigs slight, oftener pilose; leaves opposite entire, generally sericeous; normal flowers in axillary or terminal umbelliform, sometimes few or 1-florous cymes; abnormal, oftener solitary. (*Warm western North America, New Spain*.<sup>4</sup>)

48. **Gaudichaudia** H. B. K.<sup>5</sup>—Flowers 2-morphous; calyx of normal 8-10-glandulose. Petals denticulate. Stamens 5, oppositipetalous, of which 2 are oftener anantherous; filaments at base 1-adelphous glabrous; anthers short glabrous. Germens 3; style 1, gynobasic (or more rarely 2, 3, of which 1, 2, are smaller). Samaræ 1-3, cristate at back and alate at margins. Abnormal flowers (very small) fruit and other characters of *Janusia*.—Slender shrubs, often voluble; leaves opposite entire, eglandulose pubescent, often silky-2-auriculate at base; flowers<sup>6</sup> solitary or oftener as in *Janusia* (or *Camarca*) spuriously umbellate. (*Western part of Central North America, Mexico*.<sup>7</sup>)

<sup>1</sup> Yellow; the inferior abnormal (very small).

<sup>2</sup> Spec. 7, 8. VELLOZ. *Fl. Flum.* 194; iv. t. 172 (*Malpighia*).—GRISEB. *Linnaea*, xiii. 187; Mart. *Fl. Bras. Malpigh.* 104, t. 22.—WALP. *Rep.* v. 349; *Ann.* vii. 476.

<sup>3</sup> *Nov. Gen. et Spec.* 1.—A. JUSS. *Malpigh.* 343, t. 21.—B. H. *Gen.* 261, n. 46.—H. BN. *Payer Fam. Nat.* 312.—*Acosmus* DESVX. *Cat. Hort. Par.* (1829).

<sup>4</sup> Spec. 4, 5. A. RICH. in *Mém. Mus.* ii. 399, t. 13.—BENTH. *Pl. Hartweg.* 12 (*Gaudi-*

*chaudia*).—WALP. *Rep.* v. 348; *Ann.* ii. 206; iv. 370.

<sup>5</sup> *Nov. Gen. et Spec.* v. 156, t. 445.—A. JUSS. *Malpigh.* 335, t. 21.—ENDL. *Gen.* n. 5564.—B. H. *Gen.* 261, n. 45.—H. BN. *Payer Fam. Nat.* 312.

<sup>6</sup> Orange or yellow; the lower ones abnormal uncoloured.

<sup>7</sup> Spec. 10-12. HOOK. and ARN. *Bech. Voy. Bot.* t. 57.—SCHULT. *Linnaea*, v. 217; x. 243.—BENTH. *Pl. Hartweg.* 14.—WALP. *Rep.* 345.

## XLV. MELIACEÆ.

### I. MELIA SERIES.

The Bead trees or *Melia*<sup>1</sup> (fig. 462-464) have hermaphrodite regular, often pentamerous, flowers. In that case the convex re-

*Melia Azederach.*



Fig. 462. Floriferous branch (3).

ceptacle supports a calyx with five sepals, at first imbricate in the bud, then early ceasing to touch one another, covered outside with

<sup>1</sup> L. *Gen.* n. 576 (part.). — J. *Gen.* 265. — *Prodr.* i. 621. — SPACH, *Suit. à Buffon*, iii. 183. — A. JUSS. *Meliac.* (*Mémoire sur le Groupe des Méliacées*, *Mém. Mus.* xix. (1830), 153, 67, 352. — GÆRTN. *Fruet.* ii. 474 (part.). — DC.

glandular hairs. With them alternate five much longer petals, imbricate or contorted in præfloration. The androecium is formed of ten stamens, superposed, five to the sepals, and five to the petals. All are monadelphous, and the filaments are united in a long cylindrical tube (fig. 464) whose upper opening is laciniated in a score

*Melia Azederach.*



Fig. 463. Portion of inflorescence.

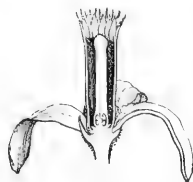


Fig. 464. Longitudinal section of flower ( $\frac{3}{4}$ ).

of unequal coloured tongues. More inwardly are inserted, at the top of the tube, the bilocular introrse anthers, dehiscent by two longitudinal clefts.<sup>1</sup> The gynæceum is found inside the tube of the androecium; it is composed of a free ovary, surrounded at its base by an hypogynous glandular disk, annular, and tapering at the top in a style whose capitate stigmatiferous apex is divided into a number of small lobes equal to those of the ovary cells. These are often five in number, superposed to the petals, or else three to six. In the internal angle is seen a longitudinal placenta supporting two ovules, superposed or nearly so, descendent, with the micropyle turned upwards and outwards.<sup>2</sup> The fruit is a drupe with flesh of little thickness, whose stone is uni- or pluri-locular, with, in each cell, a seed whose coats enclose an embryo surrounded with albumen in small quantity often membraniform. The cotyledons are foliaceous, and the superior radicle but little developed. There are flowers of *Melia* with six parts and twelve stamens; there are some, like those of the *Azadirachta*,<sup>3</sup> whose ovary has three cells and the stone never more than one. This genus contains only two or three species; more than

t. 2, n. 4.—ENDL. *Gen. n.* 5520.—PAYER *Organog.* 118, t. 26.—B. H. *Gen.* 332, n. 7.—H. BN. *Payer Fam. Nat.* 404.—*Azederach* T. *Inst.* 616, t. 387.—ADANS. *Fam. des Pl.* ii 342.

<sup>1</sup> The pollen is ovoid, with three or four folds,

and becomes spherical in water, with three bands and papillæ. (H. MOHL, *Ann. Sc. Nat.* sér. 2, iii. 335.)

<sup>2</sup> A double coat.

<sup>3</sup> A. JUSS. *Meliac.* 68, t. 2, n. 5.—SPACH, *op. cit.* 185.—ENDL. *Gen. n.* 5521.

double have been distinguished.<sup>1</sup> They are trees with alternate leaves, compound-pinnate or bi-, tri-pinnate, often covered with star-like hairs in the young parts, then glabrous; the folioles are unsymmetrical, dentate or serrate. The flowers are numerous, arranged in the axils of the leaves in very ramified pedunculate clusters, composed of cymes usually biparous. They belong to the warm regions of Asia and Australia. One of them has been introduced into all the tropical and temperate parts of the world.

Not far from the Azederachs are ranged *Cipadessa*, *Munronia*, and *Naregamia*, having like them compound or decomposite leaves, and nearly all belonging to tropical Asia. The first has a gamosepalous calyx with four or five teeth, valvate or slightly imbricate petals, and stamens free above for a considerable extent of the filament, surmounted on each side of the anther by a dorsal point generally longer than itself. The gynæceum is surrounded by a small cupula-shaped disk. *Munronia* has foliaceous sepals and ten stamens united by their filaments in a long tube, to the outer face of which are adnate, up to a certain height, the long membranous and imbricate petals. The ovary is surrounded by a disk enveloping it like a sack with superior tubular opening, and the leaves are trifoliolate or pinnate. *Naregamia* has very nearly the flower of *Munronia*; but the long petals are independent of the long tube of the androecium, formed of only five pieces, with apiculate anthers; the calyx is short and dentate. The hypogynous disk is short, like that of *Cipadessa*, and the leaves are always trifoliolate. *Quivisia*, consisting of shrubs from the eastern islands of South Africa, is also closely allied to *Melia* and the preceding genera, especially *Cipadessa*, having its more or less imbricate pentamerous or tetramerous calyx and corolla. But the staminal filaments are united in a tube to a greater height; the ovary is destitute of disk, and the organs of vegetation are very easily distinguished; for they have simple leaves, usually alternate. There are species of *Quivisia* from Oceania whose floral type is variable, whose stamens may become few in number, and whose fruit is more fleshy than the African species; they have been called *Varva*. The leaves

<sup>1</sup> CAV. *Diss.* t. 207, 208 (*Azadirachta*).—WIGHT, *Icon.* t. 17, 160.—C. GAY *Fl. Chil.* i. 373.—MIQ. *Fl. Ind.-Bat.* i. p. ii, 532.—GRISEB. *Fl. Brit. W.-Ind.* 128.—BENTH. *Fl. Austral.* i.

380.—TR. *Ann. Sc. Nat.* sér. 5, xv. 363.—BOISS. *Fl. Or.* i. 954.—WALP. *Rep.* i. 427; v. 373; *Ann.* i. 963; iv. 386; vii. 553.

are equally simple and alternate in the *Turraea* (fig. 465), met with in all the warm regions of the old world and having the flower of *Quivisia*, with a very long staminal tube supporting the anthers inside its upper opening, often accompanied outside by a collarette of small blades whose number and shape are variable. The gamose-

*Turraea sericea*.

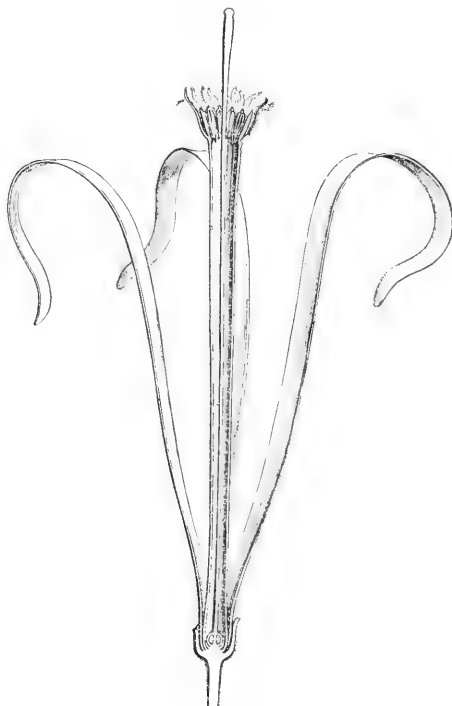


Fig. 465. Longitudinal section of flower.

palous calyx has divisions of little depth, four or five in number; they become deeper in *T. lanceolata*, of which a distinct genus has also been made under the name of *Calodryum*, and in which the petals remain a certain time adherent by the base of their internal

face with that of the staminal tube, but nevertheless are finally detached.

## II. TRICHILIA SERIES.

The species of *Trichilia*<sup>1</sup> (fig. 466-470) have regular and hermaphrodite flowers. They have generally a calyx with five imbricate

*Trichilia spondioides*.



Fig. 467. Longitudinal section of flower.



Fig. 466. Flower (?).



Fig. 470. Oper. fruit.



Fig. 469. Flower, without the corolla and androecium.



Fig. 468. Flower, with corolla removed.

divisions, five alternate imbricate petals, and ten monadelphous stamens, superposed, five to the divisions of the calyx, and five to the petals. All are united below in a tube for a variable extent of the filaments, then free and surmounted by a bilocular introrse anther, dehiscent by two longitudinal clefts,<sup>2</sup> often accompanied outside by an equal number of alternate, simple or bifid, prolongations of the summit of the tube. The gynæceum is free, with an ovary having two or three biovulate cells, surmounted by a style with stigmatiferous apex dilated to a head or disk, divided into two or three more or less distinct lobes. The ovules are descendent, anatropal, the micropyle directed upwards and outwards, sometimes collateral,

<sup>1</sup> L. Gen. 528.—ADANS. *Fam. des Pl.* ii. 343.  
—J. Gen. 265.—POIR. *Diet.* viii. 56; Suppl. v. 339.—DC. *Prodr.* i. 622 (part.).—A. JUSS. *Mélic.* 83, t. 7.—SPACH, *Suit. à Buffon*, iii. 194.  
—ENDL. *Gen.* n. 5541.—B. H. *Gen.* 337, n. 27.  
—H. BN. *Payer Fam. Not.* 405.—*Barbilus* P. *Bu. Jam.* 216.—DC. *Prodr.* ii. 91 (*Barbylus*).

—*Elcaja* FORSK. *Fl. Æg.-Arab.* 127.—*Portesia* CAV. *Diss.* 369, t. 215, 216.—*Torpesia* REEM. *Syn.* 86.—*Mafurcira* BERTOL. *Misc. Bot.* ix. t. 2.  
—*Acrilia* GRISEN. *Fl. Brit. W.-Ind.* 129.—*Pholacidia* GRISEN. *loc. cit.*

<sup>2</sup> The pollen resembles that of *Melia* (p. 471, note 1).

sometimes inserted one above the other. The base of the gynæceum is surrounded by a disk resembling a ring projecting or mounting, in the form of a glandulous layer more or less thick, sometimes along the ovary, sometimes on the internal face of the staminal tube. The fruit is capsular, very nearly globular, with pericarp often coriaceous, dehiscant in two or three valves which have a partition on the middle of their internal face, with one or two seeds surrounded by a fleshy membrane,<sup>1</sup> and containing under their coats a fleshy exalbuminous embryo, with thick plano-convex cotyledons and short superior radicle. There are flowers of *Trichilia* which are tetramerous, octandrous; the staminal tube perhaps cut straight at the top and destitute of appendages;<sup>2</sup> it may split unequally during anthesis;<sup>3</sup> and the eight or ten staminal filaments may become free for nearly all or even for the whole of their length,<sup>4</sup> without all these variations being sufficient to distinguish genera in this group, which, thus understood, contains about thirty species.<sup>5</sup> They belong to the tropical regions of Africa, and especially of America.—They are trees or shrubs, glabrous or covered with hair. The leaves are alternate, imparipinnate or trifoliolate, with folioles opposite or alternate and flowers usually numerous, axillary, collected in more or less ramified clusters of cymes or glomerules.

*Odontandra*<sup>6</sup> was formerly confounded with *Trichilia*; it is a closely allied genus from tropical America, formed of plants with 1 3-foliolate or imparipinnate leaves, whose flowers have four or five valvate petals, free or united at the base, a disk slightly developed or wanting, loculicidal fruits and seeds with fleshy external envelope. This genus should not be retained, since it may include species with a highly developed disk and flowers with corolla very distinctly imbricate. We make them a section of *Trichilia*.

*Owenia*, formed of Australian trees, with pinnate leaves, are closely allied with *Trichilia*, having the calyx and corolla imbricate, with a

<sup>1</sup> Seeming to be an aril generalised or nearly so.

<sup>2</sup> In the section *Portesia* (Cav.).

<sup>3</sup> Sect. *Aerilia* (Griseb.).

<sup>4</sup> Sect. *Mafureira* (Griseb.).

<sup>5</sup> Jacq. *Amer.* t. 82, 175; *Hort. Schanbr.* t. 102.—H. B. K. *Nor. Gen. et Spec.* v. 214; vii. 226.—A. S. H. *Fl. Bras. Mer.* ii. 76, t. 98 (*Moschoxylum*), 99.—Guillem. et Perr. *Fl. Sen. Tent.* i. 125, t. 30.—Harv. et Sond. *Fl. Cap.* i.

246 (part.).—Griseb. *Fl. Brit. W.-Ind.* 129.—Tr. *Ann. Sc. Nat. sér. 5*, xv. 363, 372 (*Odontandra*).—Walp. *Rep.* i. 432; ii. 817; v. 375; *Ann.* ii. 227; iv. 389; vii. 558.

<sup>6</sup> H. B. K. *Nov. Gen. et Spec.* vii. 229.—A. Juss. *Meliac.* 103.—Endl. *Gen.* n. 5547.—B. H. *Gen.* 337, n. 26.—*Elutheria* P. Br. *Jam.* 369 (not Ræm.).—*Moschoxylum* A. Juss. *Meliac.* 86, t. 8, n. 19.—Endl. *Gen.* n. 5542.—B. H. *Gen.* 336, n. 25.—*Odontosiphon* Ræm. *Syn.* 85.

diplostemonous androecium. The disk is annular or very nearly wanting. The ovary generally has three cells (and in one species ten or twelve), and each cell contains a single descendent ovule. The fruit is drupaceous, sometimes hardly fleshy, with a plurilocular stone, and the seeds, attached by their internal edge, are covered by a thin fleshy coat. *Heynea* also has flowers with four or five parts. The petals are imbricate, and sometimes valvate or nearly so, in *Walsura*, which is distinguishable from the true *Heynea* only by the indehiscence of its slightly fleshy fruit. Both have stamens whose filaments, instead of being united to the top in a sort of monadelphous sack, are deeply separated (sometimes even nearly to the base). All are woody and belong to tropical Asia. The leaves have one or three folioles, or more often a larger number of pinnate folioles. In the *Ekebergias*, the tropical and south African analogues of the preceding types, there are also five imbricate petals, ten stamens with anthers exerted to the cupuliform and 10-dentate tube, and a cupuliform disk. But the fruit is a berry presenting two to five incomplete cells or even a single one. The seeds are destitute of a true aril.<sup>1</sup>

In the small group of *Guarea*, the general characters, especially of the gynæceum style and disk, are the same as in the preceding types; but the androecium is easily distinguished by the anthers, inserted inside the tube, remaining entirely enclosed in it, or exceeding it only by a very small part of the summit. The *Guareas* themselves, all of tropical America, have 3-6-merous and diplostemonous flowers. The calyx and corolla are usually valvate. They become imbricate, however, in *Ruaya*, which has been considered the type of a distinct genus, without this difference of præfloration seeming to us to have more importance here than in many other genera of this group. The gynæceum, sessile or stipitate, usually shows towards its base a superficial glandular thickening, more or less distinctly circumscribed. The ovary cells each contain one or two ovules, primarily descendent, with micropyle exterior and superior; and in the loculicidal capsular fruit, are seeds totally or in part covered by a membranous aril originating from the hilum. *Dasycoleum*, from

<sup>1</sup> *Beddomea*, from the mountains of India, is described as having, with the flowers of *Ocunia* and *Trichilia*, stamens with thick connective, and the marginal cells of the anther finally confluent. Its trilobular ovary is destitute of hypo-

gynous disk. *Hearnia*, an Australian plant, allied, it is said, to *Beddomea*, is distinguished by the shape of its anthers (connective) and its two parietal placentas. (See page 498).



Manilla and Borneo, has the perianth of the true *Guarea*, with a longer and narrower bud, petals valvate or nearly so, and an ovary whose obconical foot is also slightly thickened into a glandular layer, representing the disk. The anthers are five in number, hidden in the tube of the androecium, whose upper part is, at their level, split into ten obtuse tongues. It consists of trees with pinnate leaves and very numerous flowers arranged in large clusters much ramified and compound. *Turxanthus*, formed of shrubs from tropical Africa, has the perianth of *Dasycoleum*, 4 or 5-merous, but with a diplostemonous androecium; parietal placentas and ovules nearly orthotropous. *Synoum*, an Australian tree, with imparipinnate leaves, has shorter tetramerous flowers, with imbricate contorted petals and a diplostemonous androecium. The disk, but little developed, is also only a thickening of the base of the ovary, and the ovules and seeds are attached by a large hilum below a cellular projection of the placenta. The species of *Aglaiia* likewise have short, small, numerous flowers, usually pentamerous. But they are polygamo-dicecious and isostemonous. The petals are contorted or imbricate, and inside them is seen, as it were, a second corolla, urceolate or nearly globular; this is only the petaloid tube of the androecium, entire or lobate, with the sessile or enclosed anthers inserted at the top of its internal surface. It surrounds the gynæceum, rudimentary in the male flowers, destitute of disk, and, in the female, possessing an ovary with one, two or three uni- or biovulate cells. The fruit is a sort of indehiscent coriaceous berry, whose seed or seeds are coated by a pulpy arillate layer. These plants, glabrous or covered with scaly or starry hairs, inhabit the warm regions of Asia and Oceania; they have imparipinnate or trifoliolate leaves. The *Lansiums* ought not perhaps to be distinguished generically. They have larger flowers, dicecious, but with diplostemonous androecium. The ovary contains two to five cells, and the arillate seeds are surrounded by a coriaceous and indehiscent pericarp. They are trees from tropical Asia and the Indian Archipelago, with imparipinnate leaves, the female flowers in axillary clusters, much ramified on the male stems. It is not easy to distinguish, by precise characters, *Amoora*, consisting of trees from Asia and tropical Oceania, whose flowers are polygamo-dicecious, 3-5-merous, with sepals free or united in a cupula, petals thick, imbricate, and an androecium whose filaments form a campanulate

or globular sack, supporting six to ten sessile and enclosed anthers. The ovary, destitute of disk, has 3-5 uni-or bi-ovulate cells, and the loculicidal, capsular fruit contains seeds surrounded by a fleshy aril.

In another sub-series whose principal genus is *Epicharis*, the sessile anthers are also enclosed in a long tube near the summit of which they are inserted; moreover, the disk, taking a large development, forms round the ovary a thick tube not adhering to it. In the species of *Epicharis*, all natives of tropical Asia and Oceania, the flowers have a cupuliform calyx, valvate or more or less imbricate, four to seven valvate petals, rarely imbricate, and a diplostemonous androecium, whose tube is free or, more rarely, adherent below to the corolla. The biovulate cells are two to five in number, and the fruit is a loculicidal capsule. *Cabralca* represents in South America the same floral type, with a pentamerous and imbricate calyx and corolla. The fruit is not known; the inflorescence occupies the axil of the imparipinnate leaves. *Sandoricum*, closely allied to the preceding genera by the imbricate perianth, androecium and disk, is distinguished by the slight concavity of the receptacle, rendering inferior the base of the ovary and slightly perigynous corolla, as well as by the five deep, erect, and contiguous divisions of the stigmatiferous apex of the style and the fleshy indehiscent fruit. It consists of trees from the Moluccas with trifoliolate leaves. *Chisocheton* has almost the flower of *Epicharis* with the tubular and narrow bud of *Dasycoleum*. The polygamo-dioecious flowers are tetramerous, with 5-8 stamens, and the disk is free, tubular. It consists of trees from tropical Asia and Oceania, whose fruit is capsular, and the leaves compound-pinnate.

### III. SWIETENIA SERIES.

The small flowers of *Swietenia*<sup>1</sup> (fig. 471-476) are hermaphrodite and regular. The convex receptacle bears a short patulous calyx,

<sup>1</sup> L. *Gen.* n. 575.—J. *Gen.* 266.—GÆRTN. *Fruet.* ii. 89, t. 96.—DESROUSS. *Dict.* iii. 678 (part.).—DC. *Prodr.* i. 625.—TURP. *Dict. Sc. Nat.* Atl. t. 170.—A. JUSS. *Meliac.* 96, t. 11.—SPACH, *Suit. à Buffon*, iii. 163.—ENDL. *Gen.* n. 5549.—B. H. *Gen.* 338, n. 30.—H. BN. *Payer*

*Fam. Nat.* 406.—*Mahagoni* CASTEB. *Hrt.* 2 t. 8, (ex ADANS. *Fam. des Pl.* ii. 343).—*Guidonia* ADANS. *loc. cit.* (not PLUM. *Gen.* t. 24).—*Cedrus* MILL. *Dict.* 2 (not ENDL. *loc. cit.*)—*Rosa* SCOP. *Introd.* n. 1014.

quinquefid, with obtuse divisions, slightly quincuncially imbricate. With them alternate five longer, obtuse, reflexed petals, tapering at the base, whose præfioration is generally contorted. Then comes an androecium of ten stamens superposed, five to the sepals, and five to the petals. The bilocular introrse anthers, dehiscient by two longi-

*Swietenia Mahagoni.*



Fig. 472. Flower (♂).

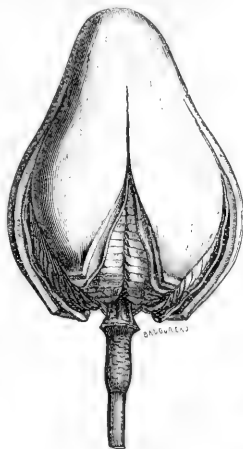


Fig. 476. Dehiscent fruit.



Fig. 473. Longitudinal section of flower.



Fig. 471. Bud (♀).

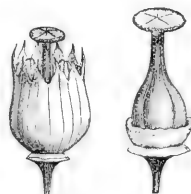


Fig. 474. Flower, with perianth removed. Fig. 475. Flower, with perianth and androecium removed.

tudinal clefts, are inserted near the upper orifice of an urceolate sack formed by the union of the monadelphous filaments, and in the interval of the ten projecting teeth into which the urceolate edge is cut. This contains the free and superior gynæceum formed of an ovary surrounded by a circular or obscurely crenulate disk, and surmounted by a style whose summit is dilated to a large stigmatiferous mass with five lobes separated by radiating grooves. In the internal angle of each ovarian cell, superposed to a petal, are found numerous anatropal descendent<sup>1</sup> ovules, arranged in two vertical series. The fruit is a nearly ovoid<sup>2</sup> septicidal capsule, whose five bilaminate valves are separated above and below by a thick columella, dilated below into five short wings, and loaded with numerous seeds, imbricate.

<sup>1</sup> A double coat.

<sup>2</sup> Slightly compressed in one direction.

cate, descendent, surmounted by a large woody wing, at the top of which is the point of attachment, and traversed longitudinally by the raphe. In the lower part these seeds are dilated to a small chamber containing a large fleshy embryo, with a short nearly transverse radicle, and thick cotyledons, more or less united to the fleshy albumen surrounding them. There is only one species of this genus, *S. Mahogoni*, better known under the name of mahogany. It is a beautiful tree from the Antilles and the neighbouring parts of the main land. The leaves are alternate, usually paripinnate, with folioles often opposite, petiolulate, unsymmetrical at the base. Its flowers are collected, in the axils of the leaves and at the summit of the branches, into more or less ramified clusters of cymes.

*Soyimida*, an Indian tree, differs from *Swietenia* only by its thicker and shorter disk, by the denticulation of the tube of the androecium, which, instead of being simple, is bifid, and by the wing of the seeds, which, instead of being confined to the upper part, is prolonged above and below them. *Khaya*, a large tree from Senegal, is as closely allied; but its flowers are tetramerous. The tongues of its staminal tube are equal in number to the large, petaloid, and convolute anthers; and its capsule, like that of *Soyimida*, opens above and below to allow the seeds, edged all round by a short wing, to escape. In this series are also ranged *Chickrassia*, Indian trees, whose 4-5-partite flowers have a calyx with very short teeth, and a cylindrical staminal tube, very slightly crenulate at its upper orifice surmounted by eight or ten anthers. The elongated ovary is destitute of disk, and the trimerous, septicidal capsule opens from top to bottom to allow the seeds, with posterior wing, to escape. *Elutheria* consists of plants from the Columbian and Peruvian Andes, having tetramerous flowers, imbricate or contorted petals, eight stamens inserted at the top of the tube in the interval of as many teeth, with a connective prolonged in a long and slender strap, and an ovary with four multiovulate cells. The capsular papyraceous septifragal fruit contains seeds prolonged in a long wing, analogous to that of *Swietenia*. The leaves of *Elutheria* are alternate, imparipinnate, with opposite folioles, dentate like a saw, tomentose; the flowers are axillary.

The species of *Carapa* form by themselves a small distinct group, whose place in this series is uncertain. They have pluriovulate ovary cells, bringing them near the preceding genera; but the 4-5-merous flowers are nearly those of *Trichilia*, with an imbricate calyx,

contorted petals, and staminal filaments united in an urceolate sack in which the anthers, eight to ten in number, are included. The fruit is a large capsule whose partitions partially disappear, and whose seeds, in the form of irregular pyramids, are collected on the rudiment of a central columella. They are beautiful trees growing on the sea coast of all tropical regions, and whose alternate leaves are compound-pinnate.

#### IV. CEDRELA SERIES.

The flowers of *Cedrela*<sup>1</sup> (fig. 477-482) are hermaphrodite and regular. The gamosepalous calyx has five teeth, imbricate at first.

*Cedrela Toona*.



Fig. 477. Flower (♂).



Fig. 479. Flower, with perianth removed (♀).



Fig. 478. Longitudinal section of flower.



Fig. 481. Seed (♀).



Fig. 480. Dehiscent fruit.



Fig. 482. Longitudinal section of seed.

Sometimes it is torn irregularly at the time of anthesis. Five petals form the corolla; they are valvate, imbricate or contorted in præ-floration. The androceum is isostemonous; and the stamens, in-

<sup>1</sup> P. BR. *Jam.* 158.—L. *Gen.* n. 277.—J. *Gen.* 266.—GERTN. *Fruct.* ii. 84.—LAMK. *Diet.* i. 660; *Suppl.* ii. 143; *Ill.* t. 137.—DC. *Prodr.* i. 624.—A. JUSS. *Meliac.* 102, t. 12.—SPACH, *Suit. à Buffon*, iii. 173.—ENDL. *Gen.* n. 5556.—

PAYER, *Organog.* 112.—B. H. *Gen.* 339, 994, n. 35.—H. BN. *Payer Fam. Nat.* 406.—*Jonsonia* ADANS. *Fam. de Pl.* ii. 343.—? *Pterosiphon* TURCZ. *Bull. Mosc.* (1863), i. 589.

serted outside a more or less developed glandular disk, are formed of a free filament and a bilocular introrse anther, dehiscient by two longitudinal clefts.<sup>1</sup> The gynæceum is superior; its ovary, with five oppositipetalous cells, is surmounted by a style, with stigmatiferous head more or less distinctly divided into lobes corresponding to the cells of the ovary. In the internal angle of these is seen a placenta supporting two vertical series of anatropal descendent ovules.<sup>2</sup> A distinct genus has been made of the American species, the petals of which are inserted in a manner quite peculiar.<sup>3</sup> A vertical projecting rib, borne below by the middle of the internal face, unites them to the elongated receptacle of the flower, so as to form inside each of the calycine divisions a deep well, similar to what in the *Pelargoniums*<sup>4</sup> are called "adherent spurs." The fruit is a septifragal capsule opening from top to bottom (fig. 480) in five coriaceous or membranous panels subdivided into two slight blades. The seeds are prolonged, on one side only, or on both sides in the species of the old world,<sup>5</sup> in imbricate fragile membranous wings; they enclose under their coats a fleshy albumen, of little thickness, enveloping an embryo with superior radicle and flat cotyledons, almost foliaceous. A dozen species of *Cedrela*<sup>6</sup> are known, shrubs from the tropical regions of America, Asia, and Australia. The wood is handsome, coloured, odorous; the leaves are alternate, imparipinnate, and the flowers are collected at the summit of the branches and in the axils of the leaves in ramified clusters of cymes.

*Chloroxylon*, an Indian tree, with pinnate leaves, approaches *Cedrela*, being distinguished by its diplostemonous androecium and trilocular ovary, set at the base in a thick annular disk. The fruit is capsular, trilocular, but loculicidal. The species of *Flindersia*, which are, on many accounts, abnormal in this group, have, however, the receptacle and imbricate petals of *Chloroxylon*. But in the diplostemonous androecium, the oppositipetalous pieces are often sterile, represented by

<sup>1</sup> H. (MOHL, *Ann. Sc. Nat.* sér. 2, iii. 336) describes the pollen grains as "ovoid; fourfold; in water oval with four bands. *C. odorata*."

<sup>2</sup> With double coats.

<sup>3</sup> *Cedrus* MILL. (ENDL. *loc. cit.* a).

<sup>4</sup> See p. 7, fig. 15.

<sup>5</sup> *Toona* ROEM. *Syn.* 131.—*Cuveretia* JON. *Asiat. Res.* iv. 281.—*Surcenus* RUMPH. *Herb. Ambon.* iii. 126.

<sup>6</sup> R. et PAV. *Fl. Per.* iii. 9.—ROXB. *Pl. Coromand.* t. 238.—ROYLE, *Himal.* t. 25.—BL. *Bijdr.* 202.—A. S. H. *Fl. Bras. Mer.* ii. 85, t. 101.—Miq. *Fl. Ind.-Bat.* i. p. ii. 548; Suppl. i. 197.—TURCZ. *Bull. Mosc.* (1858), i. 41.—GRISEB. *Fl. Brit. W.-Ind.* 131.—WIGHT, *Icon.* t. 161.—F. MUELL. *Fragm.* i. 4.—BENTH. *Fl. Austral.* i. 387.—TR. *Ann. Sc. Nat.* sér. 5, xv. 377.—WALP. *Rep.* i. 436; *Ann.* vii. 560.

little tongues without anthers; the disk surrounds by a large and high tube all the quinquelocular ovary; and the capsular bristling fruit is septifragal. They are Oceanian plants with alternate and opposite leaves, punctate, compound-pinnate or 1-3-foliate.

The family of *Meliaceæ* was established by A. L. DE JUSSIEU,<sup>1</sup> but in a very vague manner, since it included some *Magnoliaceæ* as *Canella*, some *Ampelideæ* as *Leca*, some *Clusiaceæ* as *Symphonia*, and even some *Ericaceæ* as *Clethra*. ADANSON had placed *Melia* and *Trichilia* in his family of Pistachios. R. BROWN<sup>2</sup> had separated *Cedreleæ* from the other *Meliaceæ*, as a family; they were reunited by A. P. de CANDOLLE,<sup>3</sup> who, in 1824, admitted among *Meliaceæ* three tribes and sixteen genera, of which only thirteen now belong to the family; he was wrong in introducing *Strigilia* and *Houmiri*. As to the genus *Geruma*,<sup>4</sup> we do not know sufficiently well at present to what group to unite it, and it remains provisionally, with some others,<sup>5</sup> among the doubtful *Meliaceæ*. In 1830, A. L. DE JUSSIEU<sup>6</sup> made known his researches on the group of *Meliaceæ*, to which he attributed four tribes or secondary subdivisions, and thirty-six genera, one of which belonged to *Ternstroemiaceæ* and twelve ought to be thrown aside as being a useless repetition. Twenty-one genera remain to which contemporary botanists have added only a very small number. *Elutheria* of RÆMER<sup>7</sup> was recently reinstated among *Swietenieæ*. TURZANINOW discovered in 1868<sup>8</sup> the *Dasycoleum* of the Philippines, a genus to which we have just added a new species from Borneo. J. HOOKER<sup>9</sup> established in 1862 the genus *Beddomea*; F. MUELLER the genera *Owenia* and *Hearnia*, in 1857<sup>10</sup> and 1865.<sup>11</sup> We<sup>12</sup> have proposed the new African genus *Turraopsis*; which, for us, raises the number of generic types to thirty-

<sup>1</sup> Gen. (1789) 263, Ord. 11; *Mém. Mus.* iii. 436; v. 226.—BARTL. *Ord. Nat.* 335.—LINDL. *Introduct.* ed. 2, 101; *Veg. Kingd.* 463, Ord. 173.—ENDL. *Gen.* 1046, Ord. 225.—AG. *Theor. Syst. Plant.* 225.—H. BN. *Payer Fam. Nat.* 404, *Fam.* 178.

<sup>2</sup> *Flind. Voy.* (1814), 64; *Misc. Works* (ed. BENN.) i. 71.

<sup>3</sup> *Prodr.* i. 619, Ord. 44.

<sup>4</sup> FORSK. *Fl. Ægypt. Arab.* 62.—J. *Gen.* 264.—ENDL. *Gen.* n. 4570.—B. H. *Gen.* 330 ("Euphorbiacea?") 387. (Celastraceæ? ?).

<sup>5</sup> They are: 1. *Leptophragma* (R. BR. et

BENN. *Hors. Pl. Jav. Kar.* 185), an Australian plant which is perhaps *Turraea pubescens* HELLEN.—2. *Piptosaccos* (TURCZ. *Bull. Mosc.* (1858), i. 415;—B. H. *Gen.* 330. A genus (of Trichiliæe ?) little known.

<sup>6</sup> *Mémoire sur le Groupe des Meliacées* (in *Mém. Mus.* xix. 153).

<sup>7</sup> *Synops.* 122 (1846).

<sup>8</sup> *Bull. Mosc.* (i.) 414.

<sup>9</sup> *Gen.* 336.

<sup>10</sup> *Hook. Kew Journ.* ix.

<sup>11</sup> *Fragm.* v.

<sup>12</sup> *Adansonia*, xi. (1874).

one, containing nearly three hundred and twenty species all belonging to the warm regions of the world. One *Melia*, it is true, extends from North China to the northern banks of the Mediterranean. To the south, the genus *Epicharis* is also represented by a New Zealand species, the Cape of Good Hope again possesses a species of *Elkebergia* and two species of *Turraea*. But the majority of the genera are tropical. The genus *Trichilia*, existing in the warmest parts of Africa and South America, does not advance in North America beyond the warm parts of Mexico. The *Lansiums* in tropical Asia stop at the Himalayas. Except *Melia*, met with in both worlds, and, as we have seen, even in the temperate parts, all the genera of the *Melicee* series are peculiar to the tropical regions of the old world. The genus *Turraea*, the most widely-extended of these genera, is found at the Cape, Madagascar, and the Mascarine Islands, in tropical Asia and Oceania, and in tropical eastern and western Africa. Australia possesses the genera *Synoum*, *Hearnia*, and *Owenia*. Tropical America presents as special genera *Guarea*, *Cabralea*, *Swietenia*, and *Elutheria*; she divides with the old world the genera *Melia*, *Trichilia*, and *Cedrela*, to say nothing of *Carapa*, consisting of coast plants which, like the mangrove, are met with on all the tropical shores of both worlds. We may estimate the species peculiar to the new world at almost a hundred (nearly a third of the family).

The characters up to the present constant in this family are: alternation of the leaves, absence of stipules, regularity of the flowers and primitive direction of the descendent ovules, with the micropyle turned upwards and outwards.<sup>1</sup> Other characteristics, which, although not constant, are at least very rarely wanting, being: the hermaphroditism of the flowers, the independence (between themselves) of the parts of the corolla, the definite number of the pieces of the androecium (isostemonous or diplostemonous). The characters which, on the contrary, vary the most, are: the union or independence of the staminal filaments, the number of the ovules and seeds, the presence or absence of a wing on the seeds and of albumen inside them; then the simple or compound character of the leaves, the relations of the sepals to each other and the mode of

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<sup>1</sup> Not to speak of the union of the ovarian part of the carpels to which we shall refer presently.



præfloration; the æstivation of the petals, their independence or union with the tube of the androceum; the absolute number of the stamens, the form and proportions of the disk (which may be totally wanting); the nature of the pericarp, the dimensions of the aril (whose existence is not constant), and the configuration of the cotyledons. The last of these characters serves to distinguish the genera, as we have seen; the first three are employed to separate the tribes or series whose distinctive characteristics are summed up in the following manner:—

I. MELIÆÆ.—Stamens monadelphous, usually united in a tube for a considerable length. Free ovary with one or several biovulate cells. Fruits dry or fleshy, with seeds destitute of wings, fleshy albumen, usually of little thickness.<sup>1</sup> Embryo fleshy, with foliaceous or plano-convex cotyledons.—Trees or shrubs,<sup>2</sup> simple or compound, 3-foliolate, compound or decompound-pinnate, leaves generally entire, very rarely dentate or serrate.—6 genera.

II. TRICHILIÆÆ.—Stamens monadelphous (rarely almost free), tube independent and united externally to the petals. Anthers exerted (*Eutrichiliææ*) or enclosed in the tube. Ovary free or very rarely adherent by its base to the concavity of the receptacle. Disk wanting, or short, or due to a simple thickening of the foot or base of the ovary, or high, tubular (*Epicharideæ*). Seeds without wings, exalbuminous. Embryo with thick, plano-convex, fleshy cotyledons, sometimes conferruminate. Ovary with several 1–2-ovulate cells. Fruit dry or fleshy.—Trees or shrubs, with pinnate leaves, leaflets nearly always entire. Ovary with several 1–2-ovulate cells. Fruit dry or fleshy.—17 genera.

III. SWIETENIÆÆ.—Stamens monadelphous, in number double that of the petals. Ovary cells pluriovulate. Fruit capsular, loculicidal or oftener septifragal. Seeds generally winged with or without albumen.—Trees, usually high, with compound pinnate leaves.—6 genera.

IV. CEDRELEÆÆ.<sup>3</sup>—Stamens free, in number equal to or double the petals. Filaments inserted under a thick hypogynous disk.

<sup>1</sup> Reduced to a simple membrane in certain *Melia* and in the Oceanian *Quivisia* of the section *Favææ*.

<sup>2</sup> Except in *Naregamia* and *Munronia*.

<sup>3</sup> *Cedreleæ* R. Br., *Flind. Voy.* 64.—AD. BR.

*Enum.* 85, Fam. 160.—*Cedrelacæ* A. Juss. *Meliac.* 95.—LINDL. *Introd.* ed. 2, 103; *Veg. Kingd.* 461, Ord. 172.—ENDL. *Gen.* 1053, Ord. 226.—AG. *Theor. Syst. Plant.* 225.

Ovary cells multiovulate. Fruit capsular loculicidal or septifragal. Seeds compressed, albumen wanting or in small quantity.—Trees with leaves generally compound pinnate.<sup>1</sup>—3 genera.

AFFINITIES.—The *Meliaceæ* are very closely allied to the *Sapindaceæ*, and perhaps ought not to be separated from them as a distinct family. It is the rule, we know,<sup>2</sup> that the *Sapindaceæ* are distinguished “by the ascendent ovules, with ventral raphe and exterior micropyle, as well as by their stamens interior to the disk.” But we already know that there are several genera of *Sapindaceæ* with regular flowers, in which, as in the *Meliaceæ*, the disk disappears or is interior to the stamens. The *Aitonia*, having the descendent ovule with the superior micropyle and monadelphous stamens, although their vesicular fruit brings them very near to certain *Sapindaceæ*, are intermediate between these and the family now under consideration. There is not the slightest reason, we must admit, why we should not attribute genera such as *Hippobromus*, *Hypelate*, *Huerteæ*, *Melicocca*, to this family as to *Sapindaceæ*. With the same organs of vegetation, a fruit often analogous, seeds frequently arillate, an embryo usually exalbuminous, the *Meliaceæ* seem to represent a regular form of *Sapindaceæ*, with disk interior to the androecium, superior radicle, and particularly with carpels constantly united, in the lower part, in a plurilocular ovary.

USES.—It is not astonishing that the properties<sup>3</sup> of the *Meliaceæ* are in great part analogous to those of the *Sapindaceæ*. Those of *Melia* are the best known and without contradiction very diverse. Thus, the leaves of *M. Azederach*<sup>4</sup> (fig. 462-464) are employed in India as stomachic and astringent. The inner bark, fruits, and roots are vermifugal, used for tape-worm and the lumbricoid *Ascarides*. Its fruits have been said to be poisonous, although we are assured that in

<sup>1</sup> Unifoliate in certain *Flindersia*.

<sup>2</sup> See p. 385.

<sup>3</sup> ENDL. *Enchirid.* 551.—LINDL. *Veg. Kingd.* 464; *Fl. Méd.* 151.—GUIB. *Drog. Simpl.* ed. 6, iii. 586.—ROSENTH. *Syn. Pl. Diaphor.* 762, 1151.

—H. BN. *Dict. Encycl. Sc. Méd. sér. 2*, vi. 417.

<sup>4</sup> L. *Spec.* 550.—CAY. *Diss.* vii. 363, t. 207.

—LAMK. *Ill.* t. 372.—DC. *Prodr.* i. 621, n. 1.—MER. et DEL. *Dict. Mat. Méd.* iv. 290.—ROSENTH. *op. cit.* 763.—LINDL. *Fl. Méd.* 151. H. BN. *Dict. Encycl. Sc. Méd. sér. 2*, vi. 416 (*Lilas des Indes, de la Chine, Laurier grec, Arbre sain, A. à chapelets, Margousier, Lotier blanc, Cyrouenne, Faux-Sycomore, Patenôtre*).

Carolina children eat them without inconvenience. The oil extracted from the pulp is used for lighting and painting. The stones are employed in making chaplet beads, the leaves in dyeing, and the wood, in cabinet-work. It is further said that in a strong dose this plant is purgative, that its bark cures chronic quinsy, hysterics, and diarrhœa. The same properties have been attributed to *M. semper-virens*<sup>1</sup> from the Antilles. *M. Azadirachta*<sup>2</sup> is also employed in India as vermifuge. Its bitter, tonic, astringent bark is used for the treatment of hysteria and intermittent fever. The oil of the fruit is also used for lighting, and the plant is equally tinctorial. These different bead-trees, acting probably only as astringent and anti-diarrhœic, have been pointed out as specific against cholera. The fruit may be used to prepare a fermented liquor, considered a stomachic in India. The *Trichilias* are generally evacuant medicines. *Elkaja* of the Arabs has received, on account of its emetic properties, the name of *T. emetica*.<sup>3</sup> Another South American species has been named *T. cathartica*.<sup>4</sup> According to JACQUIN the negresses use the purgative root of *T. trifoliolata* as abortive.<sup>5</sup> *T. havensis*<sup>6</sup> is considered in South America as efficacious for dropsy, jaundice, affections of the liver and spleen, syphilis, and even sterility. There are, besides, species of the same genus that are astringent: thus, *T. moschata*,<sup>7</sup> of Jamaica, produces the *Juribali* bark, reported as bitter and astringent, a remedy for intestinal obstructions, cephalic affections, remittent fevers, typhoid affections, small-pox, and measles. We again meet with the same variety of properties in the used species

<sup>1</sup> Sw. *Fl. Ind. Occ.* ii. 737.—*M. Azederach* β L. *Spec.* 550 (*Lilas des Antilles*).

<sup>2</sup> L. *Spec.* 550.—Cav. *loc. cit.* t. 208.—*Azadirachta indica* A. Juss. *Meliac.* 69, t. 2, n. 5.

<sup>3</sup> VAHL, *Symb.* i. 31.—DC. *Prodr.* i. 620, n. 5.—LINDL. *Fl. Med.* 151.—GUILL. et PERR. *Fl. Sen. Tent.* i. 126.—OLIV. *Fl. Trop. Afr.* i. 335.—*Elcæja* FORSK. *Fl. Æg.-Arab.* 127.—*Rochetia chiloensis* DEL. ROCH. *Deux. Voy. Bot.* n. 47.—*Maforeira oleifera* BERTOL. *Misc. Bot.* ix. 6, t. 2.—*Geniostephanus tomentosus* FENZL. *Flora* (1844), 312. This plant is used by the Arabs to shelter the coffee plantations. They prepare an antispasmodic ointment with the oil of sesamum mixed with its seeds and fruits (*Dioug-el-kai, Roka*).

<sup>4</sup> MART. ROSENTH. *op. cit.* 765.—*Moschoxylon catharticum* MART. (*Marinheiro da folha munda*

MARCGR.).

<sup>5</sup> L. *Spec.* 551.—JACQ. *Amer.* 129, t. 82.—DC. *Prodr.* i. 623, n. 14.—LINDL. *Fl. Med.* 152 (*Cer-soa macho* of the Spaniards, *Kersboom* of the Danes).

<sup>6</sup> JACQ. *Amer.* 129, t. 175, fig. 38.—H. B. K. *Nov. Gen. et Spec.* v. 216.—DC. *Prodr.* n. 6.—ENDL. *Enchirid.* 552.—ROSENTH. *op. cit.* 765.—*T. glabra* L. *Syst.* xiii. 294 (*Marinheiro da folha larga* MARCGR. ex MÉR. et DEL. *loc. cit.* 767).

<sup>7</sup> Sw. *Fl. Ind. Occ.* 735.—ROSENTH. *op. cit.* 766.—*T. odorata* ANDR. *Bot. Repos.* t. 637 (ex DC. *Prodr.* n. 8).—*T. spondioides* JACQ. (fig. 467-471), and *T. Catigoa* A. S. H., the wood of which is employed in cabinet-work, are also species used for dyeing (ROSENTH. *op. cit.* 766).

of the genus *Guarea*.<sup>1</sup> *G. purgans*,<sup>2</sup> from Brazil, is, like certain species of *Trichilia*, employed as purgative, emetic, abortive; it is a dangerous evacuant. *G. spiciflora*,<sup>3</sup> on the contrary, is celebrated for its bitter astringent bark; it has also been recommended for cases of dropsy, and for cutaneous, syphilitic, and abdominal affections, etc. In Guiana, the Ball-wood, or *G. Aubletii*,<sup>4</sup> is considered to be abortive; it is also a very violent evacuant. *G. trichilioides*,<sup>5</sup> of the Antilles, is a species with the odour of musk; its bark and wood contain a bitter resinous substance. There is in Columbia a *Guarea* considered as an excellent substitute for Ipecacuanha; it is, perhaps, our *G. apiodora*,<sup>6</sup> a species, every part of which, especially the bark, has a very strong odour of celery. Certain *Meliaceæ* of the Indian Archipelago have a strong odour of garlic, and are used, on that account, as a condiment. Ancient botanists often named them *Alliaria*.<sup>7</sup> They are principally species of *Epicharis* (BLUME). *Dysoxylon*<sup>8</sup> and *Hartighsea*,<sup>9</sup> congeneric to them, are also sometimes among these "tree garlies." The species of *Sandoricum*, from the Philippines and Moluccas, are generally astringent plants. The root of *S. indicum*<sup>10</sup> is aromatic, stomachic, antispasmodic. It is employed in Java for leucorrhœa, often mixed with that of *Carapa*. The fruits are edible, often described under the name of false Mangostans. They have the size and form of an ordinary apple, a soft whitish flesh, an acidulated taste, but at the same time a slight alliaceous flavour. From the *Hantol*<sup>11</sup> of India, refreshing and astringent preserves and syrups are prepared.<sup>12</sup> The *Lansiums* are also fruit trees. The pulp is watery, fresh, and sweetish; it is said to be delicious.

<sup>1</sup> The *Cabraleas*, so closely allied to *Guarea*, have analogous properties. *C. Canjerana* MART. has a root whose bark cures ague fits and dropsy. The juice of its fruit is employed as an insecticide.

<sup>2</sup> A. JUSS. A. S. H. *Fl. Bras. Mer.* ii. 83.—ROSENTH. *op. cit.* 766 (*Marinheiro*).

<sup>3</sup> A. JUSS. *loc. cit.* 81 (*Marinheiro da folha larga*). The *Jito* of PISON, an energetic medicine of Brazil, is perhaps (LINDE. *Veg. Kingd.* 464) this species or the preceding.

<sup>4</sup> A. JUSS. *Meliac.* 89.—LINDE. *Fl. Med.* 152.—*Trichilia Guara* AUBL.—*Guarea trichilioides* RICH. (nec L.).

<sup>5</sup> L. *Mantiss.* 228.—CAV. *Diss.* 366, t. 210.—A. JUSS. *Meliac.* 88.—LINDE. *Fl. Med.* 152.—ROSENTH. *op. cit.* 766.—*Melia Guara* JACQ. *Amer.* 126, t. 176.—*Trichilia Guara* L. *Spec.* 551.—*Guidonia major* *Samyda foliis* BURM. *Icon.*

147, fig. 2 (*Bois rouge* of St. Domingo, *Guanco blanco*, *Trompillo*, *Mestizo* of Columbia). To this species, without doubt, belongs *G. Aubletii* (note 4).

<sup>6</sup> H. BN. *Adansonia*, x. 110, n. 36.

<sup>7</sup> RUMPH. *Herb. Amboin.* ii. 81, t. 20.

<sup>8</sup> Such are *D. aculeatissimum* BL. and *macrocarpum* BL. (ROSENTH. *op. cit.* 764).

<sup>9</sup> Like *H. Forsteri* A. JUSS. *Meliac.* 76 (*Trichilia alliacea* FORST. *Prodr.* n. 189).

<sup>10</sup> CAV. *Diss.* vii. 359, t. 202, 203.—DC. *Prodr.* i. 621.—BL. *Bijdr.* 163.—LINDE. *Fl. Med.* 153.—HASSK. *Retzia*, i. 146.

<sup>11</sup> CAMELL.  *Ic.* MSS. 136.—RAY, *Suppl. Luz.* 54, n. 9.—TAMM. *Dict.* iii. 69.—*Sandoricum* RUMPH. *Herb. Amboin.* i. 167, t. 64.

<sup>12</sup> *S. nervosum* BL. and *glaberrimum* HASSK. (*Retzia*, i. 145.—WALP. *Ann.* iv. 387) have also edible fruits.

*L. domesticum*,<sup>1</sup> of the Indian Archipelago, is the best known. Its very bitter seeds are vermicidal, and its bark is used for smoking meat. *L. aqueum* JACK, and *humile* HASSK., of Java, have also edible fruits. Also in India *Aglaia edulis*<sup>2</sup> and *Nyalelia racemosa* DENNST., which are congeneric; in Java, *Walsura* (?) *pinnata* HASSK. Animals eat not only the pericarp, but also the fleshy coloured aril of several *Aglaia*,<sup>3</sup> *Lansium*, and *Amoora*. *A. Rohituka*<sup>4</sup> of India has oleaginous seeds whose fatty matter is used for burning and making soap. The bark of *Heynea trijuga*<sup>5</sup> is used for dyeing, and that of *H. Piscidia*<sup>6</sup> is employed by the fishermen to poison the rivers.

A large number of *Swietenia* and *Cedreleæ* are celebrated for their uses.<sup>7</sup> The *Carapas* belong to the tropical coasts of the world. The large pyramidal seeds of *C. guianensis*<sup>8</sup> yield an oil which, according to AUBLET, the Galibis extract by boiling them in water, and then pounding them and making them drain into a slab hollowed like a gutter, which they expose to the rays of the sun. The negroes of Guiana are satisfied sometimes to press out this paste in a straining bag, the meshes of which are traversed by the oil. This, thick and bitter, mixed with annatto, is applied to the hair and skin, which it preserves from the stings of insects, and especially from the attacks of the Chigos (*Pulex penetrans*). It is probably the same species that, growing on the western coast of tropical Africa, has received the name of *C. guineensis* or *Touloucouna*, and from whose seeds is extracted also in that country an oil of *Touloucouna*, or rather a sort of butter, unctuous to the touch, melting in the hand, odorous, and extremely bitter. The bark of the tree is also very bitter; it has been recommended as a febrifuge, and its properties were at first thought to be due to an alcaloid resembling that of the *Cinchona*.

<sup>1</sup> BL. *Bijdr.* 165.—ROSENTH. *op. cit.* 764.—LINDL. *Veg. Kingd.* 464 (*Langsat, Lanséh, Ayer-ayer*).

<sup>2</sup> *Milnea edulis* ROXB. *Fl. Ind.* i. 637.—ROSENTH. *op. cit.* 764.—ROYLE, *Ill. Himal.* 141.

<sup>3</sup> *A. Odorata* LOUR. (*Fl. Cochinch.* ed. 1790, 173; — *Camunium chinense* RUMPH. *Herb. amboin.* vii. 28, t. 18), used in China to perfume tea (*Cay-ngau*).

<sup>4</sup> WIGHT and ARN. *Prodr.* i. 119.—ANDERSONIA *Rohituka* ROXB. *Fl. Ind.* ii. 213.—*Spñarosacme Rohituka* WALL.

<sup>5</sup> ROXB. *Bot. Mag.* t. 1738.—DC. *Prodr.* i. 624.—ROSENTH. *op. cit.* 765.

<sup>6</sup> *Walsura Piscidia* ROXB. *Fl. Ind.* ii. 388.—WIGHT and ARN. *Prodr.* i. 120.

<sup>7</sup> ENDL. *Enchirid.* 553.—LINDL. *Veg. Kingd.* 462.—ROSENTH. *op. cit.* 768.

<sup>8</sup> AUBL. *Guian.* Suppl. 33, t. 387.—LAMK. *Ill.* t. 301.—DC. *Prodr.* i. 626, n. 1.—OLIV. *Fl. Trop. Afr.* i. 336.—H. BN. *Dict. Encycl. des Sc. Méd.* xii. 305.—*C. guineensis* G. DON, *Lond. Hort. Brit.* 168.—*C. Touloucouna* GUILL. et PERR. *Fl. Sen. Tent.* i. 128.

Now, it is admitted<sup>1</sup> to be a slightly acid, resinous, uncrystallizable principle, the *touloucounin*. This bark, also called *Andiroba*, is rich in tannin. Its oil has been extolled latterly for rheumatism, skin disease, and maladies of the scalp. *C. ? procera*<sup>2</sup> of India, a tree with magnificent wood, is also bitter and tonic. The species of this genus constituting the section *Xylocarpum* are also very bitter, especially *C. obovata*<sup>3</sup> and *moluccensis*.<sup>4</sup> The *Cedrelæ* are in general bitter and aromatic. The bark of *Cedrela Toona*<sup>5</sup> (fig. 478-483) is resinous, astringent; it has been substituted, it is said, with success, for quinine in the treatment of intermittent fevers. It acts with particular efficacy when employed concurrently with the *Kutulegee* of the Bengalese, which is a Leguminosa, *Cesalpinia Bonducella*. In Java, it has been administered with the greatest success in cases of diarrhoea, dysentery (after the inflammatory period), severe epidemic fevers, etc. *C. febrifuga*<sup>6</sup> has precisely identical properties. In Columbia, *C. montana*<sup>7</sup> is equally considered to have a febrifugal bark. *C. angustifolia*<sup>8</sup> of Peru has an odour of leeks, also met with, it is said, in the flesh of animals eating its fruits. All these species have a beautiful wood used in building or even in making certain furniture. But the most celebrated of the species of *Cedrela*, in this respect, is the plank or female mahogany, that is to say, *C. odorata*<sup>9</sup> of central and southern America, whose reddish resinous odorous wood, almost incorruptible, serves for various uses in the Antilles, and especially in making boxes for sugar and cigars. Its bark is very astringent. From its wood are extracted an aromatic resin and a febrifuge extract. Its fruit is vermifuge. The true furniture mahogany is *Swietenia*

<sup>1</sup> E. CAVENTOU, *Du C. Touloucouna*. Paris, (1859).

<sup>2</sup> DC. *Prodr.* i. 626, n. 2.—*Trichilia procera* FORSYTH.

<sup>3</sup> BL. *Bijdr.* 179.—*Xylocarpum obovatus* A. JUSS. *Meliac.* 92.

<sup>4</sup> LAMK. *Dict.* 1, 621.—DC. *Prodr.* n. 3.—H. BN. in *Dict. Encycl. Sc. Méd.* xii. 307.—*Xylocarpum Granatum* KEN. *Nat.* 20, p. 2.—W. *Spec.* ii. 328 (*Nirie*).

<sup>5</sup> ROXB. *Pl. Corom.* iii. t. 238; *Fl. Ind.* i. 635.—DC. *Prodr.* i. 624, n. 3.—LINDL. *Fl. Med.* 156.—ROSENTH. *op. cit.* 770.

<sup>6</sup> BL. *Bijdr.* 119.—FORST. *Diss. Cédar, Febrif.* Lugd.-Bat. (1836—MÉR. et DEL. *Dict. Mat. Méd.* ii. 167. Syn. for LINDLEY (*Fl. Med.* 156),

of the preceding (*Quinquina des Indes Orientales*).

<sup>7</sup> MOR. ex TURCZ. *Bull. Mosc.* (1858), 415.—TR. *Ann. Sc. Nat.* sér. 5, xv. 378.—ROSENTH. *op. cit.* 770 (*Cedro*).

<sup>8</sup> MOQ. ex DC. *Prodr.* i. 624, n. 2.—A. JUSS. *Meliac.* t. 12, n. 29.—ENDL. *Enchirid.* 554. The fresh *C. odorata* has, it is said, the same alliaceous odour.

<sup>9</sup> L. *Spec.* 289.—LAMK. *Ill.* t. 137.—SLOANE, *Hist.* ii. t. 220, fig. 2.—P. BR. *Jam.* 158, t. 10, fig. 1.—DC. *Prodr.* n. 1.—MÉR. et DEL. *Dict. Mat. Méd.* ii. 168.—ENDL. *Enchirid.* 554.—GUIB. *op. cit.* iii. 589.—ROSENTH. *op. cit.* 770 (*Cédreacajou*, *C. des Barbades*, *Cédrel*, *Cailecra d'Amérique*).

*Mahogoni*<sup>1</sup> (fig. 472-477), a superb tree of tropical America, whose coloured and odorous wood is so much sought after. It exudes a sort of gum giving it its odour, not at all agreeable when it is fresh, and which preserves it from worms. The bark is bitter, astringent, febrifugal, anti-putrid. The fruit is used to extract an oil called *Caraba*. *S. febrifuga*,<sup>2</sup> become the type of the genus *Soymida*, has also a useful reddish wood; it is a tonic employed in India for ague fits. The bark is especially used,<sup>3</sup> its abuse may produce nervous accidents, vertigo, and stupor. It is recommended for gangrene, typhoid affections, and as astringent for diarrhœa; a sort of gum-kino is extracted from it. *Chickrassia tabularis*,<sup>4</sup> of the same country, is also a beautiful tree with useful wood and strongly astringent antidiarrhœic bark. *Khaya senegalensis*<sup>5</sup> is the Senegal Mahogany or *Cailcedra*. The wood, analogous to that of *Swietenia*, is less beautiful, less valued, of a more vinous shade, retaining the polish less permanently. It contains also a gum-resinous substance, and its bark is employed for the same purposes as quinine, for ague fits, flux wounds, hæmorrhage. *Chloroxylon Swietenia*<sup>6</sup> yields one of the Satin Woods<sup>7</sup> of commerce, that of India or Atlas Wood. From the incised bark flows a resin analogous to that of the Conifers, especially *Dammara*, having the same uses.<sup>8</sup> The leaves of *Flindersia* are loaded with glandular punctuations, like *Chloroxylon* and the *Rutaceæ*; <sup>9</sup> corresponding to the presence of an essential oil sometimes extracted from *F. Australis*,<sup>10</sup> and especially *F. amboinensis*.<sup>11</sup> The sapid fruits of this serve as rasps to the natives. The Yellow Wood

<sup>1</sup> L. *Spec.* 271.—Cav. *Diss.* vii. 365, t. 209.—Turp. *Dict. Sc. Nat.* Atl. t. 170.—MÉR et DEL. *Dict. Mat. Méd.* vi. 615.—DC. *Prodr.* i. 625, n. 1.—Guir. *op. cit.* iii. 588.—LINDL. *Fl. Med.* 155.—ROSENTH. *op. cit.* 768.—*Cedrus Mahogoni* MILL. (*Cédre des Antilles*).

<sup>2</sup> See p. 505, note 2.—Guir. *op. cit.* iii. 588, 590.—LINDL. *Fl. Med.* 155.—ROSENTH. *op. cit.* 769.

<sup>3</sup> *Rohuna* bark.

<sup>4</sup> See p. 506, note 1. LINDL. *Fl. Med.* 157.—ROSENTH. *op. cit.* 769.

<sup>5</sup> See p. 505, note 4.—Guir. *op. cit.* iii. 588.—LINDL. *Fl. Med.* 157.—ROSENTH. *op. cit.* 768.

<sup>6</sup> See p. 508, note 2.—ROSENTH. *op. cit.* 769.—H.B.N. *Dict. Encycl. des. Sc. Méd.* xvi.

<sup>7</sup> On the structure of this wood, see OLIV. *Stem Dicot.* 10. The wood of all the useful Meliaceæ ought to be studied in detail.

<sup>8</sup> Another species has been distinguished in India, *C. dupada* BUCHAN. whose resin is used to calk ships (ROSENTH. *loc. cit.*).

<sup>9</sup> With which they are found to have certain incontestable affinities, but from which their fruits and seeds will distinguish them.

<sup>10</sup> R. BR. *Flind.* Foy. ii. 595, t. 1.—BENTH. *Fl. Austral.* i. 388, n. 1.—PAYER, *Elém.* 237, fig. 539.

<sup>11</sup> POIR. *Dict. Suppl.* iv. 650.—DC. *Prodr.* i. 625, n. 2.—ROSENTH. *op. cit.* 770.—*Arbor radulifera* RUMPH. *Herb. Amboin.* iii. 201, t. 129.—POIR. *Dict.* vi. 58.—BUCH. *Dec.* x. (Cent. 5), t. 8 (*Caju Barocdan, Radulier*).

of New South Wales is that of *F. xanthoxyla*.<sup>1</sup> The *Melias* are cultivated in our gardens, and in our hothouses some species of *Trichilia*, *Guarea*, *Cedrela*, and *Swietenia*, all remarkable for the elegance of their divided foliage. *Carapa guianensis* flowers here sometimes. The leaves are remarkable in their youth for the production of a sweetish substance, secreted by glands whose existence is temporary.<sup>2</sup> Those of *Ekebergia convallariavodora*,<sup>3</sup> a species from Madagascar, has in fact the very pleasant odour of the lily of the valley.

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<sup>1</sup> *F. Oxleyana* F. MUELL. *Fragn.* 1, 65; iii. 25.—BENTH. *Fl. Austral.* i. 389, n. 3.—*Orkya xanthoxyla* A. CUNN. *Hook. Bot. Misc.* i. 246, t. 54.—ROSENTH. *op. cit.* 770. Mentioned also as useful woods are: that of *F. Schottiana* F. MUELL. in Australia, and in New Caledonia that

of *F. Fournieri* (PANCH. et SEB. *Bois N.-Caled.* 238), a species of doubtful autonomy (*Manoué*).

<sup>2</sup> On the development of these leaves, see H. BN. *Bull. Soc. Linn. Par.* 22.

<sup>3</sup> H. BN. *Adansonia*, xi. 263.



## GENERA.

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### 1. MELIÆÆ.

1. **Melia** L.—Flowers hermaphrodite regular, 5–6-merous, receptacle convex. Sepals imbricate. Petals same in number free subspathulate, contorted or imbricate, patent. Stamens 10–12, verticillate in 2 series; filaments connate in cylindrical petaloid erect tube; anthers included under dilated and 10–12-fid (lobes 2-fid) mouth of tube erect, introrsely 2-locular. Germen free, girt at base with hypogynous annular disk; cells 3–6, petals (though same in number) opposite; style slender erect, apex stigmatose capitate, 3–6-lobed, deciduous; ovules in cells 2, subsuperposed descendent; micropyle extrorsely superior. Fruit drupaceous slightly fleshy; putamen osseous, 1–6-locular; cells 1, 2-spermous; testa of descendent seed crustaceous; albumen fleshy or slightly membranous; cotyledons of inverse embryo foliaceous; radicle terete superior.—Trees or shrubs; leaves alternate, pinnate, or 2–3-pinnate exstipulate, glabrous or stellately tomentose; leaflets petiolulate dentate or serrate; flowers in axillary ample very ramose compound-cymiferous racemes. (*All tropical regions*). See p. 470.

2. **Cipadessa** BL.<sup>1</sup>—Calyx 5-dentate. Petals 5, valvate. Stamens 10; filaments unequal, connate only at base in short cupule, free above and produced beyond the subapiculate introrse anthers on both sides to a subulate longer or subequal sometimes pilose lacinia.

<sup>1</sup> *Bijdr.* 162 (1825).—A. JUSS. *Meliac.* 70.—  
ENDL. *Gen.* n. 5523.—*Mallea* A. JUSS. *Meliac.*  
69, t. 2 (1830).—ENDL. *Gen.* n. 5522.—B. H.

*Gen.* 332, n. 8.—*Heptichia* K. *Ind. Sem. Hort.*  
*Berol.* (1844), adn. 8 (ex. WALP. *Rep.* v. 373).

Germen 5-locular or more rarely (*Malleastrum*<sup>1</sup>) few or 1-locular; style erect, subelavate to apex; top of apex shortly lobate stigmatose; ovules in cells 2, descendent; micropyle extrorsely superior. Drupe oftener but slightly fleshy; pyrenæ 1-5, subcartilaginous, 1-2-spermous. Seeds subangular; albumen fleshy; cotyledons of curved embryo oblong; radicle superior.—Small trees or shrubs; leaves alternate; imparipinnate or 3-foliolate; leaflets opposite entire or coarsely serrate; the terminal larger; flowers in more or less ramose cymes axillary or lateral to uppermost branches. (*Tropical Asia and Oceania*,<sup>2</sup> *Malacca*.<sup>3</sup>)

3. *Munronia* WIGHT.<sup>4</sup>—Flowers 5-merous; sepals subfoliaceous rather large, persistent, imbricate. Petals adnate to each other and to staminal tube infundibuliform to middle, free above, patent. Stamens 10; tube cylindrical, free above, 10-dentate at apex; anthers alternate with teeth of tube, silky appendiculate, introrsely rimose. Disk membranous-tubulose, sheathing the germen and base of style. Germen ovoid; style elongate slender, stigmatose capitellate at apex. Ovules 2 in each of 5 oppositipetalous cells, superposed descendent; micropyle extrorsely superior. Capsule depressed globose subcoriaceous loculicidal; lobes and cells 5; valves solute from 5-alate columella. Seeds in cells 1, 2, plano-convex; hilum ventral depressed; margins incurved alate; cotyledons of slightly albuminous embryo plane rotundate; radicle short.—Small under-shrubs; stork short simple; leaves alternate, imparipinnate or 3-foliolate; leaflets opposite, entire or dentate; flowers<sup>5</sup> in axillary few-flowered often subcapitate cymes; pedicels 2-bracteolate. (*Eastern India, Indian Archipelago*.<sup>6</sup>)

4. *Naregamia* WIGHT and ARN.<sup>7</sup>—Flowers nearly of *Munronia*; calyx cupular, 5-fid, imbricate, deciduous. Petals 5, free elongate, imbricate or contorted. Stamens 5; tube cylindrical, free from petals, inflato-clavate to apex, 5-dentate at summit; each

<sup>1</sup> H. BN. *Adansonia*, xi. 256 (*Malagash species*).

<sup>2</sup> Spec. about 4. ROTH, *Nov. Spec.* 218 (*Melia*).—ROXB. *Cat. A. JUSS. loc. cit.* (*Elkebergia*).—WIGHT and ARN. *Prodr.* i. 118 (*Mallea*).—MIQ. *Fl. Ind.-Bat.* i. p. ii. 533.—KURZ, *Flora* (1870) 340 (*Mallea*).—WALP. *Rep.* i. 428 (*Mallea*).

<sup>3</sup> H. BN. *Adansonia*, xi. 255.

<sup>4</sup> *Ill.* i. 147, t. 54; *Icon.* t. 90.—ENDL. *Gen. n.* 5518<sup>1</sup>.—B. H. *Gen.* 331, n. 6.

<sup>5</sup> White; corolla deciduous.

<sup>6</sup> Spec. 3, 4. WALL. *Pl. As. Rar.* t. 119 (*Turraea*).—LINDE. *Bot. Reg.* t. 1413 (*Turraea*).—BENN. *Pl. Jar. Ror.* 176, 180, t. 38; *Ann. Sc. Nat.* sér 2, xv. 83.—LEM. *Jard. Fleur.* iv. t. 360.—HASSK. *Tijdschr. Nat. Gesch.* x. 138; *Cat. Hort. Bog.* 219.—MIQ. *Fl. Ind.-Bat.* i. p. ii. 534.—THW. *Enum. Pl. Zeyl.* 59.—H. BN. *Adansonia*, xi, 266.—WALP. *Rep.* i. 426; *Ann.* iv. 386.

<sup>7</sup> *Prodr.* 116.—ENDL. *Gen. n.* 5518.—B. H. *Gen.* 331, n. 5.

tooth bearing an exerted erect introrse anther surmounting the silky subulate point of the connective. Gynæceum nearly of *Munronia*; germen 3-locular, girt with annular disk; style filiform, apex stigmatose capitate; ovules in cells 2, descendent curved, laterally alate; hilum ventral; testa crustaceous rugose; albumen fleshy; cotyledons of curved embryo oblong plane, equal in length to superior terete radicle.—A small ramose glabrous shrub; leaves alternate, 3-foliolate; leaflets cuneate obovate obtuse; petiole alate; flowers axillary solitary pedunculate. (*Eastern India*.<sup>1</sup>)

5. *Quivisia* COMMERS.<sup>2</sup>—Calyx cupular, persistent, teeth 4, or sometimes (*Ginnania* <sup>3</sup>) 5, more rarely 4–8 (*Vavæa* <sup>4</sup>). Petals same in number longer, somewhat thicker, imbricate or valvate. Stamens 8–10 or rarely 11–30 (*Vavæa*); filaments connate in cyathiform or sub-campanulate tube sometimes glandulose within (*Vavæa*). Germen sessile; cells 4, 5, oppositipetalous; style slender, annulate to apex; at summit stigmatose capitate 4–5-lobed; ovules in cells 2, collaterally descendent or subsuperposed; micropyle extrorsely superior. Capsule, sometimes baccate (*Vavæa*), obovate or subglobose, oftener loculicidal 4–5-valvate; valves free from basilar columella. Seeds oblong; testa short; albumen fleshy; cotyledons of axillate straight or curved embryo plane; radicle superior.—Trees or shrubs; leaves alternate or more rarely opposite, simple, entire or in the same plant unequally lobate or pinnately subcomposite; flowers in axillary cymes few or sometimes solitary.<sup>5</sup> (*South Africa and eastern islands, Viti islands*.<sup>6</sup>)

6. *Turræa* L.<sup>7</sup>—Flowers nearly of *Munronia*, 4–5-merous; calyx subentire, dentate or deeply fid. Petals 4, 5, elongate, free from

androceum.

<sup>1</sup> Spec. 1. *N. alata* WIGHT and ARN. *loc. cit.*—WIGHT, *Icon.* t. 90.—WALP. *Rep.* i. 426.—*Turræa alata* WIGHT, MSS.

<sup>2</sup> J. *Gen.* 264.—LAMK. *Ill.* t. 302.—POIR. *Dict.* vi. 43; Suppl. iv. 641.—DC. *Prodr.* i. 620.—A. JUSS. *Meliac.* 64, t. 1.—ENDL. *Gen.* n. 5516.—B. H. *Gen.* 330, n. 1.—BAKER *Fl. Maurit.* 45.—*Gilbertia* GMEL. *Syst.* 682.—*Alabella* COMMERS. *Herb.*

<sup>3</sup> R&M. *Synops.* 90.

<sup>4</sup> BENTH. *Hook. Lond. Journ.* ii. 212.—B. H. *Gen.* 331, 994, n. 4.

<sup>5</sup> Very near to *Naregamia* and *Turræa* from the structure of the flower differing from both chiefly in the shortness of the corolla and

<sup>6</sup> Spec. 4, 5. CAV. *Diss.* viii. 367, t. 211–214.—PERS. *Enchirid.* i. 467.—A. GRAY, *Amer. Expl. Exp. Bot.* i. t. 16 (*Vavæa*).—MUELL. ARG. *Linnaea*, xxxiv. 65; DC. *Prodr.* xv. sect. ii. 227, n. 2 (*Payeria*).—SEEM. *Fl. Vit.* 35 (*Vavæa*).—H. BN. *Adansonia*, xi. 255.—WALP. *Rep.* i. 426; v. 376; Ann. iv. 388 (*Vavæa*).

<sup>7</sup> *Mantiss.* 1306.—J. *Gen.* 264.—LAMK. *Ill.* t. 351.—POIR. *Dict.* viii. 145; Suppl. v. 376.—DC. *Prodr.* i. 620.—A. JUSS. *Meliac.* 65, t. 1.—SPACH, *Suit. à Buffon*, iii. 182.—BENN. *Horsf. Pl. Jav. Kar.* 177, 180.—ENDL. *Gen.* n. 5519.—B. H. *Gen.* 331, n. 3.—BAKER, *Fl. Maurit.* 45.

staminal tube or at first coherent and later free (*Calodryum*<sup>1</sup>). Stamens 8–10, or rarely 11, 12; filaments connate in cylindrical, sometimes very long, tube, at apex entire or crenate exappendiculate or oftener produced externally to 8–10 petaloid lobes; anthers inserted in summit of tube, included or more rarely in part exserted, ligulate at apex, apiculate or submuticous. Disk annular short or 0. Germen 5-locular, or more rarely 10–20-locular (*Rutca*<sup>2</sup>); cells 2-ovulate; style slender elongate, apex variously dilate stigmatose capitate, discoidal, conical or sometimes urceolate (*Scyphostigma*<sup>3</sup>). Capsule 4–∞-locular, loculicidally 4–∞-valvate; valves free from alate columella. Seeds more or less curved smooth (of *Munronia* or *Naregamia*).—Trees or shrubs; leaves alternate petiolate, entire, sinuate or sublobate; flowers<sup>4</sup> axillary solitary or oftener cymose bracteate. (*Tropical and Southern Africa, Malacca, tropical Asia and Oceania*.<sup>5</sup>)

## II. TRICHILIEÆ.

7. *Trichilia* L.—Flowers hermaphrodite regular; calyx short, 4, 5-fid or dentate, valvate or imbricate. Petals 4, 5, alternate, free or sometimes connate at base, valvate or oftener imbricate. Stamens 8–10, or, very rarely 5; filaments rarely sub-free generally sub-entire in a tube, dentate or fid, connate; anthers inserted in laciniae at top of tube, erect, exserted, introrsely rimose, sometimes furnished on each side with a short tooth or narrow cruciform process of tube. Disk various, either free annular, entire or crenate, or more or less adnate to the germen within or to the interior of the staminal tube without, sometimes 0. Germen 2–3-locular, very rarely 4–5-locular; style erect short or rather long, apex stigmatose truncate or variously dilated or capitate, or concave, variously lobed or fid or somewhat prominently annulate below. Ovules in cells generally 2, collateral or subsuperposed descendent; micropyle

<sup>1</sup> DESV. *Ann. Sc. Nat.* sér. 1, ix. 401, t. 51. —A. JUSS. *Meliac.* 65, t. 1. —SPACH, *loc. cit.* 181. —ENDL. *Gen.* n. 5517. —B. H. *Gen.* 330, n. 2.

<sup>2</sup> RCM. *Synops.* 93.

<sup>3</sup> RCM. *loc. cit.*

<sup>4</sup> White.

<sup>5</sup> Spec. about 20. HELLEN. *Act. Holm.* (1788), 26, t. 10. —SM. *Icon. ined.* t. 10–12. —CAV. *Diss.* t. 204, 205. —VENT. *Choix de Pl.* t. 48. —

WIGHT, *Icon.* t. 1593. —RICH. *Fl. Abyss. Tent.* i. 106, t. 25. —HARV. and SOND. *Fl. Cap.* i. 244. —SCHULT. *Linnaea*, xxv. 216. —BENTH. *Fl. Austral.* i. 379. —Miq. *Fl. Ind.-Bat.* i. p. ii. 533; Suppl. i. 195. —KOTSCH. et PEYR. *Pl. Tim.* t. 6. —OLIV. *Fl. Trop. Afr.* i. 330. —F. MUELL. *Fragn.* v. 144. —H. BN. *Adansonia*, xi. 252. —WALP. *Rep.* i. 426; v. 373; *Ann.* ii. 226; iv. 386; vii. 553.

extrorsely superior.—Fruit various in form, capsular coriaceous or sub-fleshy, loculicidally 2–3-valvate, very rarely 4–5-valvate; cells 1, 2-spermous. Seeds descendent; furnished with or enclosed in a more or less evolute aril; testa coriaceous; cotyledons of exalbuminous embryo fleshy thick; radicle superior short.—Trees or shrubs; leaves alternate imparipinnate or more rarely 1–3-foliolate; leaflets opposite or alternate; flowers in axillary or terminal more or less ramosely compound cymiferous racemes. (*Tropical America, tropical and southern Africa.*) See p. 474.

8. **Owenia** F. MUELL.<sup>1</sup>—Flowers nearly of *Trichilia*; sepals 5 and petals same in number alternate longer open-recurved much imbricated. Stamens 10; anthers exerted, inserted at top of campanulate tube and surrounded by an exterior 10–∞-fid crown. Germen free, surrounded by an annular disk more or less thick (or 0); cells 3, or more rarely 10–12; cells 1-ovular; micropyle extrorsely superior; style straight, much dilated to stigmatose apex thick conical and more or less lobed at summit. Fruit drupaceous globose; flesh thick or scanty; putamen 3– or more rarely 6–12-locular. Seeds in cells solitary oblong, spongy without (arillate?); hilum ventral; cotyledons of exalbuminous embryo plano-convex; radicle retracted superior.—Glabrous trees, sometimes gum-bearing (?); leaves alternate pinnate; leaflets sub-opposite ∞; flowers in ramose axillary racemes, often 2-nate in axil of bracts; each 2-bracteolate. (*Tropical Australia.*<sup>2</sup>)

9. **Heynea** ROXB.<sup>3</sup>—Flowers hermaphrodite; calyx short imbricate, 4–5-fid. Petals 4, 5, longer, imbricate or sometimes sub-valvate (*Surcula*).<sup>4</sup> Stamens 8–10; filaments 1-adelphous at or below the base, free above and there entire or 2-fid; anthers sessile between the legs or at top of inappendiculate filament, 2-rimose. Germen oftener depressed, surrounded by or half-immersed in annular more or less fleshy disk; cells 2, 3; ovules in cells 2, descendent; style erect, apex stigmatose dilato-turbinate or sub-elevate 2–3-dentate and a little below surrounded by a thickened ring. Fruit fleshy, indehiscent (*Walsura*<sup>5</sup>) or sometimes capsularily dehiscent (*Eu-*

<sup>1</sup> Hook. *Kew Journ.* ix. 303.—B. H. *Gén.* 337, 994, n. 28.

<sup>2</sup> Spec. 5. F. MUELL. *Fragm.* iii. 13.—BENTH. *Fl. Austral.* i. 384 (part.).—WALP. *Ann.* vii. 559 [O. *cerasifera* est, fid. F. MUELL. (*Fragm.* v. 177), *Spondias pleiogyna* (p. 258)].

<sup>3</sup> Bot. Mag. t. 1738; Pl. Coromand. iii. 230

(1819).—A. JUSS. *Meliac.* 82, t. 7.—SPACH, *Suit. à Buffon*, iii. 192.—ENDL. *Gen.* n. 5540. — B. H. *Gen.* 336, n. 23.

<sup>4</sup> REM. *Synops.* 108.

<sup>5</sup> ROXB. *Fl. Ind.* ii. 386 (1824).—WIGHT and ARN. *Prodr.* i. 120.—ENDL. *Gen.* n. 5539. — B. H. *Gen.* 336, n. 22.

*hegynea*), 2-valvate, 1- or more rarely 2-spermous; testa of arillate seed crustaceous; cotyledons of exalbuminous fleshy embryo plano-convex; radicle short superior.—Trees or shrubs; leaves alternate pinnate or 1-3-foliolate; leaflets opposite or alternate (*Walsura*); flowers in axillary and terminal very ramose pedunculate sometimes corymbiform racemes.<sup>1</sup> (*Tropical Asia*.<sup>2</sup>)

10. **Ekebergia** SPARRM.<sup>3</sup>—Flowers (nearly of *Trichilia*) hermaphrodite or polygamo-dioecous; calyx short, imbricate, 5-fid. Petals 5, longer, imbricate, or rarely valvate. Stamens 10, 1-adelphous; tube campanulate, 10-dentate; teeth each antheriferous; anthers introrse exerted. Germen surrounded by annular disk, 2 5-locular; style short, clavate or subturbinate to stigmatose apex or disciform, indistinctly 2-5-lobed; ovules in cells 2, superposed descendent. Fruit baccate coriaceous indehiscent; cells 1-5, 1-spermous; embryo of exarillate seed thick fleshy.—Trees; leaves imparipinnate; leaflets opposite; flowers in axillary ramosely compound cymiferous racemes.<sup>4</sup> (*Tropical and South Africa*.<sup>5</sup>)

11. **Beddomea** Hook. F.<sup>6</sup>—“Calyx 5-partite; lobes broad ovate, imbricate. Petals 5, thick orbiculate, the interior smaller, imbricate. Staminal tube short; margin slightly crenulate. Anthers 8, thick, sessile to apex of tube exerted connivent, 3-angular acute; connective very thick; cells marginal narrow, finally confluent at apex. Germen conical shortly hirsute, immersed in inconspicuous tomentose disk, 3-locular; style short thick; stigmatically 3-lobed pyramidal; ovules in cells 2, collateral pendulous. Fruit...?—A subscandent shrub; twigs terete; in the recent ones, panicles and petioles somewhat tomentose with reddish pubescence; leaves imparipinnate; rachis terete; leaflets opposite, 1-2-paired petiolate ovately or elliptically oblong very entire; panicles axillary few-flowered.” (*Neilygherry mountains*.<sup>8</sup>)

12? **Hearnia** F. MUELL.<sup>9</sup>—“Sepals 5, unequal, imbricate. Petals

<sup>1</sup> Very near *Trichilia*.

<sup>2</sup> Spec. 8, 9. WIGHT, *III*, t. 55 (*Walsura*).—THW. *Enum. Pl. Zeyl.* 61.—Miq. *Fl. Ind.-Bat.* i. p. ii. 542; Suppl. i. 505.—H. BN. in *Adansonia*, xi. 265.—WALP. *Rep.* i. 431 (*Walsura*), 432; *Ann.* iv. 389 (*Walsura*).

<sup>3</sup> *Act. Holm.* (1779), 282, t. 9.—J. *Gen.* 265.—LAMK. *Dict.* ii. 346; Suppl. ii. 543; *III*, t. 358.—DC. *Prodr.* i. 623.—SPACH, *Suit. à Buffon*, iii. 191.—A. JESS, *Meliac.* 81, t. 6.—ENDL. *Gen.* n. 5538.—B. II. *Gen.* 335, n. 21.

<sup>4</sup> Very near *Trichilia*; it differs principally in its baccate fruit and exarillate seeds.

<sup>5</sup> Spec. 4, 5. FRESSEN. in *Mus. Senk.* ii. 278 (*Trichilia*).—HARV. and SOND. *Fl. Cap.* i. 247.—GUILL. et PERR. *Fl. Sen. Tent.* i. 126, t. 31.—OLIV. *Fl. Trop. Afr.* i. 332.—A. RICH. *Fl. Abyss. Tent.* i. 105, t. 24.—H. BN. *Adansonia*, xi. 263.—WALP. *Rep.* i. 431; *Ann.* ii. 227.

<sup>6</sup> *Gen.* 336, n. 24.

<sup>7</sup> “Flowers rather large pedicellate; calyx ferruginoustomentose; petals glabrous.” (Hook. F. by whom the characters are selected.)

<sup>8</sup> Spec. 1. B. *Indica* Hook. F. *loc. cit.*

<sup>9</sup> *Fragm.* v. 55.—B. II. *Gen.* 994, n. 24 a.

5, subobovate, imbricate. Stamens 5; tube short cupular disciform entire; anthers sessile exserted deltoidly ovate; connective ovate surmounting the marginal (disjoined) cells. Germen short, 1-locular; placenta 2, scarcely reaching the middle of the cell; ovules on each placenta 2, collateral; stigma sessile subglobose, entire or obscurely 2-lobed. Fruit globular indehiscent, 1-locular; seeds 1, 2, enclosed in a thin aril (?) ovoid; cotyledons of exalbuminous embryo thick superposed; radicle minute.—A moderate sized tree; the younger parts slightly tomentose; leaves impari- or subpari-pinnate; leaflets opposite entire; flowers<sup>1</sup> in axillary and terminal panicles.<sup>2</sup>” (*Eastern subtropical Australia*.<sup>3</sup>)

13. *Guarea* L.<sup>4</sup>—Calyx 3-6-dentate or partite or fid, valvate or imbricate. Petals 3-6, exserted, erect, valvate or more rarely imbricate. (*Ruarea*.<sup>5</sup>) Stamens twice as many as the petals; filaments connate in entire or crenate tube, externally free from corolla or very rarely connate with it; anthers enclosed introrse. Germen nude at base or glandulose-stipitate, sometimes swelling more or less into continuous or distinct glandules; cells 2-5; style erect short, apex stigmatose disciform. Ovules in cells 1, 2, descendent; or one more or less obliquely ascendent. Capsule lignose or coriaceous, smooth, costate or tuberculate, loculicidally 2-5- or oftener 4-valvate; seeds quite covered by aril; cotyledons of exalbuminous embryo superposed fleshy; radicle short dorsal.—Trees or shrubs;<sup>6</sup> leaves pinnate, opposite or alternate; flowers<sup>7</sup> in axillary subsimple, racemose or compound cymiferous racemes. (*Tropical America*.<sup>8</sup>)

14. *Dasycoleum* TURCZ.<sup>9</sup>—Flowers nearly of *Guarea*, narrower; calyx cupular short subentire or obtusely dentate. Petals 5, coriaceous, subvalvate, finally recurved. Stamens 5;<sup>10</sup> anthers

<sup>1</sup> Small.

<sup>2</sup> A genus in most points very near *Beddomea*, differing in the form of its anthers, and most distinct in the nature of its ovary.

<sup>3</sup> Spec. 1. *H. sapindina* F. MUELL.

<sup>4</sup> *Mantiss.* 1305.—J. *Gen.* 265, 451.—LAMK., *Dict.* ii. 5; Suppl. ii. 820; *Ill.* t. 301.—DC. *Prodr.* i. 623.—SPACH, *Suit. à Buffon*, iii. 199.—A. JUSS. *Meliac.* 87, t. 8.—ENDL. n. 5543.—B. H. *Gen.* 335, 994, n. 19.—? *Zurloa* TEN. in *Duch. Rev. Bot.* ii. 127 (ex B. H.).

<sup>5</sup> KARST. *Fl. Columb.* ii. 51, t. 120.

<sup>6</sup> Sometimes odorous.

<sup>7</sup> Small or rather large, white.

<sup>8</sup> Spec. about 30. VENT. *Ch. de Pl.* t. 41.—H. B. K. *Nov. Gen. et Spec.* v. 217.—A. S. H. *Pl. Us. Bras.* t. 71; *Fl. Bras. Mer.* ii. t. 100.—GRISEB. *Fl. Brit. W.-Ind.* 130.—TURCZ. *Bull. Mosc.* (1863), i. 589.—H. BN. *Adansonie*, x. 110.—TR. *Ann. Sc. Nat.* sér. 5, xv. 367 (*Ruarea*), 368.—WALP. *Rep.* i. 434; ii. 817; *Ann.* vii. 556.

<sup>9</sup> *Bull. Mosc.* (1858), i. 414.—B. H. *Gen.* 335, n. 20.

<sup>10</sup> Flowers according to B. H. 10 androus.

enclosed in a tube 10-fid above, introrsely 2-rimose.<sup>1</sup> Germen clothed at attenuated and shortly oboconical base with glandulous disk,<sup>2</sup> 1-2-locular; style erect cylindrical, apex stigmatose depressed capitate; ovules in cells 2, subsuperposed. Fruit globular stipitate baccate, 1-spermous; "hilum of peltate seed ventral."—Trees; leaves abruptly pinnate,<sup>3</sup> leaflets opposite petiolulate, unequal at base; the uppermost sometimes least; flowers in full very ramosely compound racemes. (*Borneo, Manilla.*<sup>4</sup>)

15. **Turræanthus** H. BN.<sup>5</sup>—Flowers nearly of *Dasycoleum*, 4-5-merous; calyx short cupular dentate. Petals coriaceous connate with each other in clavate tube and below with staminal tube, at apex free valvate. Stamens 8-10; anthers enclosed at top of unequally lobed or crenate tube. Disk 0. Germen 1-locular; style erect, apex depressed capitate discoid stigmatose; placenta parietal septiform 4, 5, more or less prominent, 2-ovulate. Ovules suborthotropal or presenting a very short descendent ventral raphe; micropyle ascendent extrorsely superior. Fruit...?—Glabrous shrubs; leaves alternate, imparipinnate or 3-foliate; leaflet terminal articulate; lateral alternate; flowers in small racemiform or corymbiform cymes, axillary or springing laterally from the wood, sometimes remotely alternate in slender axillary twig, articulate, bracteate. (*Tropical western Africa.*<sup>6</sup>)

16. **Synoum** A. JUSS.<sup>7</sup>—Flowers 4-merous; calyx gamophyllous; laciniae rotund or acute, imbricate. Petals 4, longer coriaceous, contorted or imbricate. Stamens 8; anthers inserted at crenulate mouth of short and broad cylindrical tube semi-exserted, introrse, 2 rimose. Germen depressed ovoid, seated upon a very short disk (?), hirsute, produced to straight style widely discoid at stigmatose apex; cells 3, 2-ovulate; ovules in pairs descendent; hilum far adnate to placenta; micropyle extrorsely superior; or finally variously oblique. Capsule globular sub-3-lobed, subfleshy, finally loculicidal; valves 3, in the middle internally septiferous; seeds furnished above with a fleshy layer (aril).—A small glabrous tree; leaves alternate imparipinnate; leaflets opposite sessile lanceolate; flowers in spurious short axillary cymiferous sparsely ramosely racemes. (*Subtropical Australia.*<sup>8</sup>)

<sup>1</sup> Pollen in superposed cateniform masses.

<sup>2</sup> Now nearly obsolete.

<sup>3</sup> Innovations and inflorescence subsericeous greyish pubescent.

<sup>4</sup> Spec. 2. H. BN. *Adansonia*, xi, 263.

<sup>5</sup> *Adansonia*, xi, 261.

<sup>6</sup> Spec. 2.

<sup>7</sup> *Meliac.* 74, t. 4.—ENDL. *Gen. n.* 5532.—*B. H. Gen.* 335, n. 18.—*Schoutensia* ENDL. *Prodr. Fl. Norfolk*, 79, not.

<sup>8</sup> Spec. 1. *S. glandulosum* A. JUSS. *loc. cit.*



17. **Aglaia** LOUR.<sup>1</sup>—Flowers polygamo-dioecious; sepals 5, free or more or less connate, imbricate. Stamens 5, alternipetalous; filaments connate in subglobular or urceolate tube, entire at apex, dentate or lobate (like gamopetalous corolla); anthers inserted at top of tube, enclosed or partly exerted, introrsely 2-rimose, pointed or mucous (*Milnea*.<sup>2</sup>) Germen short 1-3-locular; style short, apex stigmatose truncate dilated or discoid-capitate, entire or lobed; ovules in cells 1, 2, descendent. Fruit a corticate berry; seeds 1 or few; aril full or sparse (or 0?); embryo fleshy oblique or transverse.—Trees or shrubs, sometimes scurfy, lepidote or stellately pubescent; leaves alternate, 3-foliolate or imparipinnate; flowers<sup>3</sup> in axillary or rarely terminal very ramosely compound racemes. (*Tropical and subtropical Asia and Oceania*.<sup>4</sup>)

18? **Lansium** RUMPH.<sup>5</sup>—Flowers dioecious, nearly of *Aglaia* (larger); sepals and petals rotundate, imbricate. Stamens 10; anthers enclosed at summit of globular or urceolate tube, 2-seriate. Germen 2-5-locular; style short, apex stigmatose dilated, discoid or radiately 2-5-lobed; ovules, fruit,<sup>6</sup> pulpy arillate seeds and other characters of *Aglaia*.—Glabrous or pubescent trees; leaves imparipinnate; flowers axillary; the males in slender very ramose compound racemes; the females<sup>7</sup> in simple or less ramose racemes.<sup>8</sup> (*Tropical Asia and Oceania*.<sup>9</sup>)

19. **Amoora** ROXB.<sup>10</sup>—Flowers (nearly of *Lansium*) polygamo-dioecious; sepals 3-5, short, free or connate in dentate cupule. Petals 3-5, thick, imbricate. Stamens 6-10; anthers enclosed in

—BENTH. *Fl. Austral.* i. 382.—WALP. *Rep.* i. 429.—*Trichilia glandulosa* SM. *Rees's Cyclop.* xxxvi. —*T. octandra* SOLAND.

<sup>1</sup> *Fl. Cochinch.* (ed. 1790), 173.—DC. *Prodr.* i. 537.—A. JUSS. *Meliac.* 93, t. 3.—ENDL. *Gen.* n. 5524.—B. H. *Gen.* 334, 994, n. 14.—*Camunium* RUMPH. *Herb. Amboin.* v. t. 18.—*Cambania* COMMERS. *Herb.*

<sup>2</sup> ROXB. *Fl. Ind.* i. 637.—ENDL. *Gen.* n. 5525.—B. H. *Gen.* 334, n. 15.—*Nyalelia* DENNST. *Hort. Malab.* iv. 16.—*Nemedia* A. JUSS. *Meliac.* 71, t. 3.—ENDL. *Gen.* n. 5527.—? *Selbya* RÆM. *Synops.* 166.

<sup>3</sup> Small or minute.

<sup>4</sup> Spec. ad 40. BL. *Bijdr.* 169.—JACK, in *Trans. Linn. Soc.* xiv. 114 (*Milnea*).—HOOK. and ARN. *Beech. Voy. Bot.* t. 34.—WIGHT and ARN. *Prodr.* i. 118 (*Milnea*).—WIGHT, *Icon.* t. 166 (*Milnea*).—BENTH. *Fl. Austral.* i. 382.—THW. *Enum. Pl. Zeyl.* 60 (*Milnea*).—MIQ. *Fl. Ind.-Bat.* i. p. ii.

543, 544 (*Milnea*); Suppl. i. 197.—F. MUELL. *Fragm.* v. 145.—WALP. *Rep.* i. 428 (*Milnea*); *Ann.* vii. 555, 556 (*Milnea*).

<sup>5</sup> *Herb. Amboin.* i. 151, t. 54.—JACK, in *Trans. Linn. Soc.* xiv. 115, t. 4, fig. 5.—A. JUSS. *Meliac.* 81.—SPACH, *Suit. à Buffon*, iii. 190.—ENDL. *Gen.* n. 5526.—B. H. *Gen.* 334, n. 16.—*Sphaerosacme* WALL. *Roxb. Fl. Ind.* ii. 429.

<sup>6</sup> Red or yellow.

<sup>7</sup> Larger.

<sup>8</sup> A genus distinct from *Aglaia* (with which perhaps it is congeneric) principally by its diplostemonous androceum; the parts oftener larger.

<sup>9</sup> Spec. 2, 3. BL. *Bijdr.* 164.—MIQ. *Fl. Ind.-Bat.* i. p. ii. 544.—WALP. *Rep.* i. 428.

<sup>10</sup> *Pl. Coromand.* iii. t. 258. ENDL. *Gen.* n. 5528.—B. H. *Gen.* 335, n. 17.—*Andersonia* ROXB. *Fl. Ind.* ii. 212 (not KÆN. nor R. BR. nor W.).—*Amura* SCHULT. *F. Syst.* vii. 1621.—*Aphana-*

campanulate or urceolate (corolliform) staminal tube. Germen depressed; cells 2-5, 1-2-ovulate; style elongate conical, 3-4-gonal or very short and afterwards very discoidally dilated. Fruit capsular coriaceous, loculicidally 3-4-valvate; valves septiferous in middle; seeds arillate;<sup>1</sup> cotyledons of fleshy embryo often thick conferruminate; radicle short superior.—Trees; innovations sometimes lepidote; leaves imparipinnate; flowers axillary; male compound racemose; female<sup>2</sup> simply or sparsely ramose, racemose or spicate.<sup>3</sup> (*Tropical and subtropical Asia and Oceania*.<sup>4</sup>)

20. **Epicharis** BL.<sup>5</sup>—Flowers (nearly of *Guarea*) oftener 4-5-merous; calyx cupular subentire, dentate or fissus, sometimes lobate or partite, valvate (*Euepicharis*) or oftener imbricate (*Dysoxylum*.<sup>6</sup>) Petals free or sometimes at base inwardly connate with each other or oftener with staminal tube or coherent (*Hartighsea*,<sup>7</sup>) valvate or more or less imbricate. Stamens 8-10; anthers enclosed in top of subentire or oftener crenate, dentate or sometimes lobate tube, 2-rimose. Disk tubular, oftener thick, subentire, crenate or dentate sheathing the germen and base of style. Germen 2-5-locular; cells 1-2-ovulate; style erect; apex stigmatose variously dilated oftener discoid or depressed polygonal. Fruit subglobular or ovoid or piriform, woody or coriaceous or partly fleshy, indehiscent or capsular, loculicidally 2-5-valvate; seeds more or less fully arillate; cotyledons of exalbuminous fleshy embryo thick plano-convex, collateral or superposed; radicle short superior or ventral.—Glabrous or more rarely pubescent trees;<sup>8</sup> leaves pari- or impari-pinnate alternate, often collected at top of twigs; leaflets opposite or alternate, oftener petiolulate; flowers<sup>9</sup> in simple or more or less ramose cymiferous racemes or spikes, axillary or lateral, sometimes springing from

*mixis* BL. *Bijdr.* 165.—A. JUSS. *Meliac.* 71, t. 3.—*Sphaerosacme* WALL. *Cat.* (part.).—*Nimmoia* WIGHT, *Cale. Journ. of Nat. Hist.* vii. 13.—? *Monosoma* GRIFF. *Notul.* iv. 502.—*Oraoma* TURCZ. in *Bull. Mosc.* (1858), i. 411.

<sup>1</sup> Aril red.

<sup>2</sup> Larger.

<sup>3</sup> A genus distinguished from *Aglaia* (of which, with *Lansium*, perhaps it is merely a section) by the number of its parts and the dehiscence of its fruit.

<sup>4</sup> Spec. 8-10. WIGHT and ARN. *Prodr.* i. 119.—THW. *Enum. Pl. Zeyl.* 60.—BENTH. *Fl. Austral.* i. 383.—Miq. *Fl. Ind.-Bat.* i. p. ii. 535; Suppl. i. 196.—WALP. *Rep.* i. 428; *Ann.* vii. 556.

<sup>5</sup> *Bijdr.* 166.—A. JUSS. *Meliac.* 76, t. 4.—ENDL. *Gen.* n. 5533.—B. H. *Gen.* 333, n. 11 (incl.: *Cambania* REEM. *Didymocheton* BL. *Dysoxylum* BL. *Goniicheton* BL. *Hartighsea* A. JUSS. *Prasoxylon* REEM.).

<sup>6</sup> BL. *Bijdr.* 172.—SPACH, *Suit. à Buffon*, iii. 186.—A. JUSS. *Meliac.* 76, t. 4.—ENDL. *Gen.* n. 5529.—B. H. *Gen.* 332, n. 1.—*Didymocheton* BL. *loc. cit.* 177.—*Goniicheton* BL. *loc. cit.*—*Prasoxylon* REEM. *Synops.* 83.

<sup>7</sup> A. JUSS. *Meliac.* 75, t. 4.—SPACH, *Suit. à Buffon*, iii. 188.—ENDL. *Gen.* n. 5532.—KURZ. *Flora* (1870), 340.—*Cambania* REEM. *loc. cit.* 83.—*Macrochiton* BL. *Bijdr.* 172.

<sup>8</sup> Odour sometimes fetid, alliaceous.

<sup>9</sup> White or more rarely pink.

wood of stem, bracteate or ebracteate, articulate. (*Tropical and temperate Asia and Oceania*.<sup>1</sup>)

21 ? **Cabralea** A. JUSS.<sup>2</sup>—Flowers nearly of *Epicharis*, 5-merous; calyx short and petals obtuse much longer very imbricate. Stamens 10; anthers enclosed at top of tube 10-crenate at mouth, alternating with teeth of tube. Germen surrounded by wide tubular disk and shorter than it; cells 4, 5, 2-ovulate; style slender erect, apex stigmatose discoid. Fruit...?—Trees or shrubs oftener tomentose; leaves alternate imparipinnate; leaflets opposite, unequal at base; axillary ramose inflorescence of *Guarea*.<sup>3</sup> (*Brazil, Caraccas*.<sup>4</sup>)

22. **Sandoricum** CAV.<sup>5</sup>—Flowers nearly of *Epicharis*, 5-merous; calyx cupular dentate, adnate at base to bottom of germen,<sup>6</sup> valvate or imbricate. Petals 5, connivent in tube, imbricate. Stamens 10; anthers enclosed in 1-dentate tube. Disk tubular, dentate at apex, sheathing the germen and base of style. Germen not free at base; cells 5, 2-ovulate; style erect, thickened to a ring below the apex and above deeply fissured into 5 laciniae stigmatose erect thick, and finally recurved at apex. Fruit baccate globular above, indehiscent,<sup>7</sup> cells 3-5, 1-spermous; septa finally vanishing; seeds enclosed in aril externally pulpy; testa spongy; cotyledons of exalbuminous embryo plano-convex amygdaline lateral. — Glabrous or partly tomentose trees; leaves alternate, 3-foliolate; leaflets ample nervose; flowers <sup>8</sup> in axillary ramose-cymiferous racemes, bracteate. (*Northern tropical Oceania*.<sup>9</sup>)

<sup>1</sup> Spec. about 40. RUMPH. *Herb. Amboin.* ii. 81, t. 20 (*Alliaria*).—FOURST. *Prodr.* (1786), 33, n. 189 (*Trichilia*).—LABILL. *Sert. Calcd.* t. 54 (*Trichilia*).—A. RICH. *Voy. Astrol. Bot.* t. 11 (*Hartighsea*).—HOOK. *Icon.* t. 616, 617 (*Hartighsea*).—Miq. *Fl. Ind.-Bat.* i. p. ii. 536 (*Dysoxylum*), 538 (*Hartighsea*), 539 (*Didymocheton*), 540 (*Gmnocheton*); *Suppl.* i. 196.—? THW. *Enum. Pl. Zeyl.* 60 (*Dysoxylum*).—TUNCZ. *Bull. Mosc.* (1858), i. 412 (*Hartighsea*).—HOOK. *f. Fl. N.-Zel.* i. 39; *Man. N.-Zel. Fl.* 40 (*Dysoxylum*).—BENTH. *Fl. Austral.* i. 380 (*Dysoxylum*).—H. BN. *Adansonia*, xi. 257.—WALP. *Rep.* i. 129; *Ann.* iv. 387 (*Dysoxylum*); vii. 554 (*Dysoxylum*), 555.

<sup>2</sup> *Meliac.* 77, t. 5.—ENDL. *Gen.* n. 5534.—B. H. *Gen.* 333, n. 12.

<sup>3</sup> From the species of which presenting imbricate petals (*Ruarea*) a genus hitherto little

known (perhaps not to be preserved?), its fruit being unknown, it differs only in the nature of its disk.

<sup>4</sup> WALP. *Rep.* i. 431; v. 374.

<sup>5</sup> *Diss.* vii. 359, t. 202, 203.—LAMK. *Dict.* iii. 69; *Ill.* t. 350.—DC. *Pr. dr.* i. 621.—SPACH, *Suit. à Buffon*, iii. 189.—A. JUSS. *Meliac.* 80, t. 5.—ENDL. *Gen.* n. 5537.—B. H. *Gen.* 332, n. 13.

<sup>6</sup> That is from the receptacle being slightly concave, with corolla slightly perigynous; whence germen inferior at base.

<sup>7</sup> Large apple-like, acid.

<sup>8</sup> Yellow, small or rather large.

<sup>9</sup> Spec. about 5, of which one is widely cultivated within the tropics. ROXB. *Pl. Coromand.* t. 261; *Fl. Ind.* ii. 292.—Miq. *Fl. Ind.-Bat.* i. p. ii. 540; *Suppl.* i. 196.—H. BN. *Adansonia*, xi. 264.—WALP. *Rep.* i. 431; iv. 387.

23. **Chisocheton** BL.<sup>1</sup>—Flowers hermaphrodite or polygamodiceous (nearly of *Dasycoleum*), oftener 4-merous; calyx small dentate. Petals linear-elongate, coherent in slender sometimes subclavate tube, subvalvate or more or less imbricate or contorted at apex. Stamens 5-8; tube cylindrical elongate, at base oftener adnate to corolla, 5-8-fissus at apex; laciniae alternate with elongate anthers.<sup>2</sup> Germen short, 2-4-locular, enclosed in short cylindrical not adnate disk; style slender erect, apex stigmatose capitate; ovule in cells 1. Capsule coriaceous, loculicidally 2-4-valvate; valves septiferous; seeds subpeltate, more or less enclosed in aril springing from ventral hilum; cotyledons of fleshy embryo subpeltate.—Glabrous or pubescent trees; leaves abruptly pinnate; flowers in axillary or supra-axillary full compound very ramose racemes.<sup>3</sup> (*Southern India, Malaga.*<sup>4</sup>)

### III. SWIETENIÆ.

24. **Swietenia** L.—Flowers hermaphrodite regular; calyx 5-fid, imbricate. Petals 5 longer, oftener contorted, patent. Stamens 10; filaments connate in urceolate petaloid tube; anthers inserted in hollows of tube, introrse apiculate, 2-rimose. Germen sessile, surrounded by annular disk; cells 5, oppositipetalous; style short erect, apex stigmatose, discoid 5-radiate; ovules in cells  $\infty$ , inserted in 2 series in internal angle, descendent. Fruit capsular, septicidal from base; valves 5, free from 5-gonal axis and 5-alate base, 2-lamellate. Seeds  $\infty$  descendent, imbricate in 2 series, long and broadly alate above; chalaza lateral; hilum impressed at apex of wing traversed by raphe; cotyledons of transverse fleshy embryo more or less conferruminate with each other and with fleshy albumen; radicle short.—A very tall glabrous tree; wood coloured odorous; leaves alternate abruptly pinnate; leaflets opposite petiolulate oblique at base; flowers in axillary and terminal compound ramose-cymiferous racemes. (*Central continental and insul. America.*) See p. 478.

<sup>1</sup> *Bijdr.* 163.—A. JUSS. *Meliac.* 73.—B. H. *Gen.* 333, n. 10.—*Schizochiton* SPRENG. *Syst. Cur. Post.* 251.—ENDL. *Gen.* n. 5530.

<sup>2</sup> The masses of pollen often, as in *Dasycoleum*, catenately superposed distinct.

<sup>3</sup> A genus, by the form of its flowers and

other points, very near *Dasycoleum*, differing chiefly in the nature of its disk.

<sup>4</sup> *Spec.* 6, 7. *Miq. Fl. Ind.-Bat.* i. p. ii. 537; *Suppl.* i. 196.—*Turcz. Bull. Mosc.* (1858), i. 411.—H. BN. *Adansonia*, xi. 260.—*WALP. Rep.* i. 429; *Ann.* vii. 555.

25. **Soymida** A. Juss.<sup>1</sup>—Flowers nearly of *Swietenia*, 5-merous; staminal tube cupular, 10-lobed at apex; lobes 2-dentate; anthers sessile between the teeth. Germen 5-locular, surrounded at base by wide explanate disk; cells oppositipetalous,  $\infty$ -ovulate. Capsule woody, septifragal from apex; valves 5, 2-lamellate, free from septiferous 5-gonal axis. Seeds descendent, imbricate in 2-series, marginate and produced on both sides to wing (longer above); cotyledons of fleshy embryo foliaceous, auriculate at base; radicle superior very short.—A lofty tree; wood hard coloured; bark bitter; leaves abruptly pinnate; leaflets opposite; inflorescence of *Swietenia*. (*East India*.<sup>2</sup>)

26. **Khaya** A. Juss.<sup>3</sup>—Flowers nearly of *Swietenia*, 4-merous; staminal tube urceolate, 8-lobed at apex; lobes imbricate; anthers enclosed. Germen 4-locular, surrounded by annular disk; cells oppositipetalous,  $\infty$ -ovulate. Capsule woody, dehiscing septicidally (as in *Soymida*). Seeds  $\infty$ , imbricate, inserted in 2 series in faces of axis, descendent, thickly marginate; embryo albumen and other characters of *Swietenia*.—A lofty tree; wood hard coloured; leaves abruptly pinnate; leaflets few-paired; inflorescence of *Swietenia*. (*Senegambia*.<sup>4</sup>)

27. **Chickrassia** A. Juss.<sup>5</sup>—Flowers 4-5-merous; calyx cupular with short obtuse teeth. Petals 4, 5, erect much longer, contorted. Stamens 8-10; filaments connate in cylindrical tube very shortly crenulate at apex; anthers erect exerted from tube, introrsely rimose. Germen free elongate placed on disk; cells 3, oftener incomplete; ovules in each  $\infty$ , in 2 series very small; style conical continuous with top of germen, apex stigmatose slightly dilated, obscurely 3-lobed. Capsule woody, septicidal at apex; valves 3, 2-lamellate, free from 3-pterous columella; seeds  $\infty$ , compressed, imbricate in 2 series, produced downwards to a wing; cotyledons of fleshy embryo unequal

<sup>1</sup> *Meliac.* 98, t. 11.—SPACH, *Suit. à Buffon*, iii. 168.—ENDL. *Gen.* n. 5551.—B. H. *Gen.* 338, n. 32.—H. Bn. *Payer Fam. Nat.* 406.

<sup>2</sup> Spec. 1. *S. febrifuga* A. Juss. *loc. cit.* 99.—WIGHT and ARN. *Prodr.* i. 122.—WALP. *Rep.* i. 436.—*Swietenia febrifuga* ROXB. *Pl. Coromand.* 13, t. 17.—DC. *Prodr.* i. 625, n. 2.—*S. Soymida* DUNC. *Tent. Inaug.* (1797), 8.—*S. rubra* ROTTL. *Cat. Wall.* n. 4890.

<sup>3</sup> *Meliac.* 97, t. 10.—SPACH, *Suit. à Buffon*, iii. 167.—ENDL. *Gen.* n. 5550.—B. H. *Gen.* 338, n. 31.—H. Bn. *Payer Fam. Nat.* 406.

<sup>4</sup> Spec. 1. *K. senegalensis* A. Juss. *loc. cit.* 98.—GUILLEM et PERR. *Fl. Sen. Tent.* i. 130, t. 32.—OLIV. *Fl. Trop. Afr.* i. 338.—WALP. *Rep.* i. 436.—*Swietenia senegalensis* DESROUSS. *Diet.* iii. 679, n. 2.—DC. *Prodr.* i. 625, n. 3. (A plant, not without doubt, reported in Eastern tropical Africa.)

<sup>5</sup> *Meliac.* 99, t. 11, n. 27 (*Chukrasia*).—SPACH, *Suit. à Buffon*, iii. 170.—ENDL. *Gen.* n. 5552.—B. H. *Gen.* 339, n. 33.—*Plagiotaxis* WALL. *Cat.* n. 1269, 1270.

suborbiculate; radicle superior, attached to broader side of cotyledons.—A very tall tree; leaves alternate paripinnate; flowers in compound cymiferous terminal racemes. (*Western India*.<sup>1</sup>)

28. **Elutheria** RÆM.<sup>2</sup>—Flowers 4-merous; sepals short pubescent imbricate. Petals longer, imbricate or contorted, finally patent. Stamens 8; filaments connate in tube 8-dentate at apex; teeth 2-fid; anthers sessile in hollows oblong; connective produced beyond the introrsely rimose cells to a subulate ligule. Germen furnished at base with shortly stipitiform disk, 4-locular; style slender, apex stigmatose discoid; ovules  $\infty$ , 2-seriate in each cell. Fruit an elongate ovoid capsule; pericarp papyraceous, 4-valvate; valves attenuated<sup>3</sup> on both sides, free from incomplete septa. Seeds  $\infty$ , compressed and produced downwards to long membranous imbricate wing; nucleus compressed crustaceous surrounding the somewhat thick (green) embryo; cotyledons flat oval; radicle short exerted; albumen fleshy.—Tomentose<sup>4</sup> shrubs or bushes; leaves alternate imparipinnate; leaflets opposite sessile; flowers axillary solitary or in spurious cymiferous racemes. (*Columbia, Peru*.<sup>5</sup>)

29? **Carapa** AUBL.<sup>6</sup>—Flowers 4-5-merous; calyx short imbricate, equally fid or partite. Petals longer, contorted, finally reflexed. Stamens 8-10; filaments connate in urceolate tube; laciniae of 8-10-dentate or fid tube entire or 2-partite (*Xylocarpus*);<sup>7</sup> anthers introrse enclosed, inserted in hollows of tube. Germen surrounded at base with thick disk; cells 4, 5, oppositipetalous; style short, apex disciform stigmatose very dilated; ovules in each cell  $\infty$  (2-8), 2-seriate. Fruit capsular spherical or ovoid woody or fleshy; cells 1-5; septa thin sometimes vanishing; seeds in cells 1 or few large more or less deformed by mutual pressure or pyramidally angled and

<sup>1</sup> Spec. 1. *C. tabularis* A. Juss. *loc. cit.*—WIGHT and ARN. *Prodr.* i. 122.—WIGHT, *Ill.* t. 56.—*Swietenia Chickrassa* ROXB. *Fl. Ind.* ii. 390.—*S. villosa* WIGHT.—*Plagiotaxis villosa* WALL. *Cat.*

<sup>2</sup> *Synops.* 122 (not P. BR.).—B. H. *Gen.* 339, n. 4.—*Schmardæa* KARST. *Fl. Columb. Sp. Sel.* i. 187, t. 93.

<sup>3</sup> Those referring to *Swietenia*.

<sup>4</sup> Habit of some *Canoniae*.

<sup>5</sup> Spec. 1, 2. H. B. K. *Nov. Gen. et Spec.* vii. 276 (*Sapindacea* ?).—HOOK. *Icon.* t. 129 (*Gnavea*).—TR. *Ann. Sc. Nat. sér.* 5, xv. 376.—WALP. *Ann.* xii. 560. (A Peruvian plant apparently

conspecific with the Columbian.)

<sup>6</sup> *Guian.* Suppl. 33, t. 387.—LAMK. *Diet.* i. 621; *Ill.* t. 301.—DC. *Prodr.* i. 626.—A. Juss. *Meliac.* 90, t. 9.—SPACH, *Suit. à Buffon*, iii. 202.—ENDL. *Gen.* n. 5544.—B. H. *Gen.* 338, n. 29.—H. BN. *Payer Fam. Nat.* 405.—*Persoonia* W. *Spec. Pl.* ii. 331 (not MICH. nor SM.).—*Racapa* RÆM. *Synops.* 123.—*Touloucouma* RÆM. *loc. cit.*  
<sup>7</sup> SCHREE. *Gen.* n. 646.—KÖEN. A. Juss. *Meliac.* 91, t. 9.—POIR. *Diet.* viii. 806; Suppl. v. 510.—SPACH, *Suit. à Buffon*, iii. 204.—ENDL. *Gen.* n. 5545.—*Granatum* KÖEN. in *Naturf.* xx.—*Monosoma* GRIFF. *Notul.* iv. 502.

collected in a ball round the rest of the central columella; testa spongy; hilum ventral; embryo fleshy, sometimes germinating within the pericarp (*Xylocarpus*), cotyledons thick superposed often conferruminate; radicle short dorsal.—Glabrous trees;<sup>1</sup> leaves<sup>2</sup> alternate pari- or impari-pinnate; flowers<sup>3</sup> in compound ramose cymiferous racemes axillary or terminal. (*All tropical regions.*<sup>4</sup>)

#### IV. CEDRELEÆ.

30. **Cedrela** L.—Flowers hermaphrodite regular; receptacle short or long conical. Calyx short, 5-partite, sometimes fissus; præfloration at first imbricate. Petals 5, alternate, free or adnate within to middle to elongate receptacle by means of interposed vertical keel with 2 “adherent” spurs, imbricate or contorted, sometimes valvate at base. Disk more or less elevated, 5–10-lobed. Stamens equal in number to petals, and alternate with them (an equal number of staminodes sometimes being interposed); filaments subulate, or inserted with petals, or superior to mouth of spurs; anthers introrse versatile, 2-rimose, apiculate or mucous. Germen sessile at top of receptacle; cells 5, oppositipetalous; style erect, apex stigmatose discoid; ovules in cells  $\infty$ , inserted in 2 series in internal angle descendent; micropyle extrorsely superior. Capsule woody or membranous, septifragal from apex 5-valvate; valves free from septiferous axis, 2-lamellate; seeds descendent compressed, imbricate, alate on one or both sides; albumen slightly fleshy; cotyledons of slightly fleshy embryo plane subfoliaceous; radicle superior short.—Lofty trees; wood coloured; leaves alternate imparipinnate; leaflets petiolate, oftener entire,  $\infty$ -paired; flowers in compound cymiferous racemes. (*Asia, tropical America, and Australia.*) See p. 481.

31. **Chloroxylon** DC.<sup>5</sup>—Flowers nearly of *Cedrela*; receptacle short. Sepals 5, not contiguous.<sup>6</sup> Petals 5, alternate, unguiculate, imbricate finally patent. Stamens 10, verticillate in 2 series; filaments free subulate, inserted at base in hollows of thick disk; alter-

<sup>1</sup> Littoral.

<sup>2</sup> On the evolution of which see H. Bx. *Bull. Soc. Linn. Par.* 22.

<sup>3</sup> Small, white.

<sup>4</sup> Spec. 3, 4. RUMPH. *Herb. Amboin.* iii. 92, t. 61 (*Granatum*).—REM. *Synops. Hesper.* i. 122. —GUILL. et PERR. *Fl. Sen. Tent.* i. 128.—OLIV. *Fl. Trop. Afr.* i. 336.—GRISEB. *Fl. Brit. W.-Ind.*

131.—BENTH. *Fl. Austral.* i. 386.—THW. *Enum. Pl. Zeyl.* 60 (*Dysoxylon*), 61 (*Xylocarpus*).—Miq. *Fl. Ind.-Bat.* i. p. ii. 546 (*Xylocarpus*).—WALP. *Ann.* vii. 559.

5. *Prodr.* i. 625.—SPACH, *Suit. à Buffon*, iii. 171.—A. JUSS. *Méac.* 100, t. 12.—ENDL. *Gen.* n. 5553.—B. H. *Gen.* 340, n. 36.

<sup>6</sup> In first stage imbricate.

nipetalous longer; anthers subcordate apiculate introrse, 2-rimose, versatile. Germen immersed at base of disk, depressed ovoid, 3-locular; style short, apex stigmatose obscurely 3-lobed; ovules in cells to 8, in 2 series. Capsule ovoid-oblong coriaceous, loculicidal; valves 3, septiferous in middle; columella 0. Seeds imbricate, and inserted at margins of septa, unequally alate; hilum lateral; cotyledons of exalbuminous embryo plano-convex; radicle short.—A tall tree; wood hard yellow; leaves abruptly pinnate; leaflets obtuse entire; flowers<sup>1</sup> in terminal and axillary compound ramose cymiferous racemes. (*East India*.<sup>2</sup>)

32. **Flindersia** R. BR.<sup>3</sup>—Flowers hermaphrodite; sepals 5, short, imbricate, sometimes connate at base. Petals 5, longer, imbricate, finally patulous. Stamens 10, exterior to cupular or shortly tubular rather thick subentire or crenate disk, 2-seriate; oppositipetalous shorter, often anantherous or 0; filaments free, incurved at apex; anthers short suborbiculate or subcordate, introrse, 2-rimose. Germen immersed at bottom of disk free; cells 5, oppositipetalous, more or less prominent at back, and sometimes glandulose at apex; style inserted in depressed summit of germen, apex stigmatose capitate-5-lobed; ovules in cells 4- $\infty$ , 2-seriate in internal angle. Capsule oblong woody, verrucose or echinate at back, septicidal 5-valvate; valves free from septiferous and finally 5-partible columella. Seeds ascendent compressed on both sides in septa, above or on both sides produced to imbricate wing; hilum lateral at base; cotyledons of transverse exalbuminous embryo thick foliaceous; radicle short.—Trees or shrubs; leaves opposite or alternate, imparipinnate or 1-3-foliolate; rachis alate (*Strueckia*);<sup>4</sup> leaflets entire, punctate below; flowers crowded in terminal or axillary very ramose compound cymiferous racemes, articulate.<sup>5</sup> (*Tropical and subtropical Oceania*.<sup>6</sup>)

<sup>1</sup> Small, white.

<sup>2</sup> Spec. 1. *C. Swietenia* DC. *loc. cit.*—WIGHT and Arn. *Prodr.* i. 123.—WIGHT, *Ill.* t. 56 bis.—WALP. *Rep.* i. 436.—*Swietenia Chloroxylon* ROXB. *Pl. Coromand.* 46, t. 64.—W. *Spec.* ii. 557.—POIR. *Dict. Suppl.* iii. 575, n. 4.

<sup>3</sup> *Flind. Voy.* ii. 59, t. 1.—DC. *Prodr.* i. 625.—A. JUSS. *Meliac.* 101.—SPACH, *Suit. à Buffon*, iii. 172.—ENDL. *Gen.* n. 5554.—B. H. *Gen.* 340, n. 37.—H. BN. *Payer Fam. Nat.* 407.—*Oxleya* A. CUNN. *Hook. Bot. Misc.* i. 246, t. 54.—ENDL.

*Gen.* n. 6555.

<sup>4</sup> *Strzeleckya* F. MUELL. *Hook. Kew Journ.* ix. 308.

<sup>5</sup> Small, white.

<sup>6</sup> RUMPH. *Herb. Amboin.* iii. 201, t. 129 (*Arbor radulifera*).—MIQ. *Fl. Ind.-Bat.* i. p. ii. 547.—F. MUELL. *Fragm.* i. 65; iii. 25; *Journ. Pharm. Soc. Viet.* ii. 44.—BENTH. *Fl. Austral.* i. 388.—PANCH. et SÈB. *Bois N. Caléd.* 228.—WALP. *Rep.* i. 436; *Ann.* vii. 561.



# INDEX OF GENERA AND SUB-GENERA

CONTAINED IN THE FIFTH VOLUME.

- Aakesia, Tuss., 398  
 Acajou, T., 324  
 Acajuba, GÆRTN., 324  
 Acalypha, L., 212  
 Acanthocaulon, KL., 215  
 Acanthocladius, KL., 73  
 Acantholoma, GAUDICH., 228  
 Acer, T., 373, 427  
 Acidocroton, GRISEB., 201  
 Acidoton, Sw., 203  
 Acladodea, R. & Pav., 400  
 Acmathera, GRISEB., 452  
 Acosta, R. & Pav., 77  
 Acridocarpus, GUILLEM., 462  
 Acrilia, GRISEB., 474  
 Acrivola, BOERH., 14  
 Actephila, BL., 235  
 Actinostemon, KL., 135  
 Adelanthus, ENDL., 338  
 Adelia, L., 202  
 Adenoceras, ZOLL., 208  
 Adenochlæna, BvN., 220  
 Adenoclaoxylon, M. ARG., 210  
 Adenocline, TURCZ., 210  
 Adenocrepis, BL., 246  
 Adenoglochidion, M. ARG., 254  
 Adenogyne, KL., 135  
 Adenogynum, ZOLL., 220  
 Adenolinum, REICHB., 43  
 Adenopeltis, BERT., 135  
 Adenopetalum, KL., 105  
 Adenophædra, M. ARG., 202  
 Adenophyllum, Dup.-Th., 230  
 Adenorhopium, POHL, 112  
 Adenotragia, M. ARG., 217  
 Adisca, BL., 196  
 Adisca, ZOLL., 208  
 Adriana, GAUDICH., 205  
 Ægopricon, L., 134  
 Ægotoceras, RAY, 47  
 Æsculus, L., 367, 424  
 Agardhia, SPRENG., 102  
 Aglaia, LOUR., 501  
 Agrostistachys, DALZ., 184  
 Agrynea, L., 252  
 Agrynea, VENT., 255  
 Aitonia, L. F., 371, 426  
 Akania, Hook. F., 412  
 Alabella, COMMERS., 495  
 Alchornea, SOLAND., 212  
 Alchorneopsis, M. ARG., 213  
 Alectorocotonum, SCHILL., 108  
 Alectryon, GÆRTN., 404  
 Aledryon, A. CUNN., 404  
 Aleurites, FORST., 185  
 Alevia, H. Bn., 202  
 Algernonia, H. Bn., 232  
 Alphanidia, H. Bn., 193  
 Alsodeiopsis, OLIV., 333  
 Altora, ADANS., 188  
 Alvaradoa, LIEBM., 411  
 Amanoa, AUBL., 236  
 Ambinux, COMMERS., 185  
 Amirola, PERS., 412  
 Amooria, ROXB., 501  
 Amperea, A. JUSS., 215  
 Amphandra, GRISEB., 254  
 Amphilochia, MART., 102  
 Amura, SCHULT., 501  
 Anabæna, A. JUSS., 223  
 Anacanthium, H. Bn., 181  
 Anacardium, LAMK., 324  
 Anacardium, ROTTB., 324  
 Anaphrenium, E. MEY., 322  
 Anasyllis, E. MEY., 318  
 Anaua, MIQ., 248  
 Anda, A. JUSS., 185  
 Andersonia, ROXB., 501  
 Andiscus, VELLOZ., 185  
 Andrachne, L., 237  
 Andrichnia, H. Bn., 129  
 Androglossa, BENTH., 345  
 Androphoranthus, KARST., 182  
 Aneulophus, BENTH., 51, 66  
 Angelandra, ENDL., 129  
 Angostyles, BENTH., 222  
 Angostylium, M. ARG., 223  
 Anisadenia, WALL., 45, 63  
 Anisocentra, DON, 14  
 Anisobium, M. ARG., 254  
 Anisomallon, H. Bn., 332  
 Anisonema, A. JUSS., 252  
 Anisophyllum, BvN., 129  
 Anisophyllum, HAW., 108  
 Anisotaxis, M. ARG., 188  
 Anomalopteris, DON, 462  
 Anomodiscus, M. ARG., 191  
 Anomosanthus, BL., 402  
 Anomospermum, DALZ., 235  
 Anomostachys, H. Bn., 134  
 Anthacantha, LEM., 108  
 Anthostema, A. JUSS., 232  
 Antidesma, BERM., 242  
 Antipetalum, M. ARG., 242  
 Aparisthium, ENDL., 212  
 Apetalidion, M. ARG., 191  
 Aphanamixis, BL., 502  
 Aphania, BL., 348  
 Aphora, NUTT., 182  
 Apodytes, E. MEY., 331  
 Aporetica, FORST., 415  
 Aporosa, BL., 243  
 Arachne, NECK., 238  
 Ardinghelia, COMMERS., 252  
 Argothammia, SPRENG., 181  
 Argyroderodon, KL., 129  
 Argyrothammia, M. ARG., 181  
 Argythammia, BERN., 246  
 Argythammia, P. BR., 181  
 Aroeira, Pis., 266  
 Arthrothamnus, KL. & GRÆKE., 108  
 Arytera, BL., 398  
 Aspicarpa, LAGASC., 469  
 Aspidopterys, A. JUSS., 465  
 Asterandra, KL., 254  
 Astræa, KL., 129  
 Astræopsis, GRISEB., 129  
 Astrocoocus, BENTH., 221  
 Astrogryne, BENTH., 129  
 Astronium, JACQ., 318  
 Astylis, WIGHT, 248  
 Atalaya, BL., 406  
 Athroandra, Hook. F., 211  
 Athroisma, GRIFF., 187  
 Athymalus, HAW., 105  
 Aubrya, H. Bn., 52  
 Augia, LOUR., 259  
 Aulacostigma, TURCZ., 13  
 Austrobuxus, MIQ., 152  
 Averrhoa, L., 26, 41  
 Avernoium, H. Bn., 409  
 Axenfeldia, H. Bn., 196  
 Azadirachta, A. JUSS., 471  
 Azederach, T., 471  
 Baccaurea, LOUR., 246  
 Badiëra, DC., 73  
 Badiëra, HASSK., 73

- Balbisia, Cav., 11, 38  
 Baliospermum, Bl., 195  
 Baloghia, Endl., 191  
 Balsamea, Gled., 310  
 Balsamina, Gertn., 17  
 Balsamodendrum, K., 310  
 Balsamophloeos, O. Berg., 310  
 Banisteria, L., 434, 459  
 Barbilus, P. Br., 480  
 Barhamia, Kl., 129  
 Barreria, W., 328  
 Beddomea, Hook. F., 498  
 Bembix, Lour., 445  
 Bennetia, R. Br., 184  
 Bernardia, Hochst., 202  
 Bersama, Fresen., 425  
 Beryta, Pl., 192  
 Bessera, Spreng., 242  
 Bestram, Adans., 422  
 Beyeria, M., 192  
 Beyerlopsis, M. Arg., 192  
 Bia, Kl., 217  
 Biebersteinia, Steph., 1, 35  
 Billia, Peyr., 369, 424  
 Biophytum, DC., 23  
 Bischofia, Bl., 247  
 Bivonea, Rafin., 112  
 Bivonia, Spreng., 202  
 Blachia, H. Bn., 191  
 Blancoa, Bl., 407  
 Bleckeria, Miq., 212  
 Blighia, Ken., 398  
 Blimbingum, Rumph., 26  
 Blumeodendron, M. Arg., 196  
 Bocquillonia, H. Bn., 219  
 Bonania, A. Rich., 135  
 Bongium, Boiss., 108  
 Boswellia, Roxb., 312  
 Botryanthus, Kl., 222  
 Botryceras, W., 319  
 Bunea, Meissn., 289  
 Boutonia, Boj., 196  
 Brachyaulus, H. Bn., 333  
 Brachypteryx, A. Juss., 460  
 Brachystachys, Kl., 129  
 Brachytropis, DC., 72  
 Bredemeyera, W., 89  
 Brewsteria, Remy., 49  
 Breynia, Forst., 254  
 Breyniastrum, H. Bn., 254  
 Bridelia, W., 236  
 Bridgesia, Bert., 417  
 Briedelia, A. Juss., 236  
 Bromfieldia, Neck., 114  
 Bruea, Gaudich., 209  
 Brunsia, Neck., 129  
 Buchanania, Roxb., 259, 308  
 Bumalda, Thunb., 314  
 Bunchosia, L. C. Rich., 457  
 Bunius, H. Bn., 243  
 Burdachia, A. Juss., 458  
 Bureavia, H. Bn., 250  
 Bursaria, L., 260, 309  
 Byrsonima, L. C. Rich., 457  
 Cabrera, A. Juss., 503  
 Caeleboynia, Sm., 212  
 Caesarea, Cambess., 13  
 Caetia, H. Bn., 239  
 Caletopsis, M. Arg., 241  
 Callisthene, Mart., 102  
 Callisthenia, Spreng., 102  
 Callitriche, L., 151, 256  
 Calococcus, Kurz., 254  
 Calothyrsus, Spach., 369  
 Calpigyne, Bl., 152  
 Calycocarpus, Pl., 216  
 Calyptriopetalum, Kl., 129  
 Calyptron, Miq., 246  
 Calyptrorhiza, Kl., 212  
 Calyptrorhiza, Kl., 192  
 Camagnoc, Aubl., 180  
 Camarea, A. S. H., 468  
 Cambania, Commers., 502  
 Cambessedea, K., 259  
 Cambessedea, Wight, 289  
 Camirum, Rumph., 185  
 Campnosperma, Tw., 325  
 Campylia, Sweet., 9  
 Camunium, Rumph., 501  
 Canariopsis, Bl., 312  
 Canarium, L., 312  
 Candelabria, Hochst., 236  
 Candelabria, Pl., 237  
 Caoutchouc, A. Rich., 187  
 Caperonia, A. S. H., 182  
 Caproxylon, Tuss., 314  
 Capura, Blanc., 398  
 Carapa, Aubl., 506  
 Carda, Noronh., 185  
 Cardaminum, T., 14  
 Cardiopteryx, Wall., 310  
 Cardiospermum, L., 419  
 Carpodipteryx, Karst., 405  
 Carpolobia, Don, 90  
 Carumbium, Reinw., 229  
 Carusia, Mart., 465  
 Caryodendron, Karst., 214  
 Cascarilla, Griseb., 129  
 Casimira, Scop., 403  
 Cassinopsis, Sond., 335  
 Cassumbium, Rumph., 403  
 Cassuvium, Rumph., 324  
 Castanella, Spruce., 416  
 Castiglionea, R. & Pav., 114  
 Catastylium, Griseb., 254  
 Cathartolimum, Reichb., 43  
 Cathetus, Lour., 254  
 Catocoma, Benth., 89  
 Caturus, Lour., 212  
 Caucanthus, Forsk., 445  
 Caulanthium, Boiss., 108  
 Cavanilla, Thunb., 339  
 Cavanilla, Velloz., 182  
 Cedrela, L., 507  
 Cedrus, Mill., 478  
 Centandra, Karst., 226  
 Centrodiscus, M. Arg., 152  
 Centrostylis, H. Bn., 220  
 Cephalocroton, Hochst., 219  
 Cephalomappa, H. Bn., 213  
 Ceramanthus, Hassk., 254  
 Ceratogynum, Wight, 255  
 Ceratophorus, Sond., 200  
 Chaetocarpus, Thw., 186  
 Chaillatia, DC., 139  
 Chamæbuxus, DuRoi., 73  
 Chamædrifolia, Pluk., 9  
 Champadella, H. Bn., 223  
 Charidia, H. Bn., 235  
 Chariessa, Miq., 334  
 Cheilosa, Bl., 197  
 Cheilosopsis, M. Arg., 188  
 Cheirolepidium, Boiss., 108  
 Chickrassia, A. Juss., 505  
 Chiroptetum, A. Juss., 181  
 Chisocheton, Bl., 504  
 Chlamydocarya, H. Bn., 339  
 Chloradenia, H. Bn., 220  
 Chlorocaulon, Kl., 181  
 Chloroxylon, DC., 507  
 Choretropsis, M. Arg., 254  
 Choriceras, H. Bn., 240  
 Chorisandra, Wight, 254  
 Choriogonium, M. Arg., 254  
 Chorizotheca, M. Arg., 241  
 Chrysostemon, Kl., 241  
 Chymocarpus, Don, 16  
 Chytranthus, Hook. F., 414  
 Cicca, L., 252  
 Cicoides, H. Bn., 254  
 Cicopeltandra, M. Arg., 254  
 Ciconium, Sweet., 9  
 Cinogasm, Neck., 129  
 Cipadessa, Bl., 493  
 Cissarobryum, Poepp., 13  
 Cistocarpum, K., 11  
 Citronella, Don, 334  
 Cladodes, Lour., 212  
 Cladognos, Zipp., 219  
 Claoxylon, A. Juss., 210  
 Clavipodium, Desv., 192  
 Cleidion, Bl., 203  
 Cleistanthus, Hook. F., 237  
 Cleodora, Kl., 129  
 Cleopatra, Panch., 108  
 Cliococca, Bab., 45  
 Clistranthus, Port., 224  
 Clonodia, Griseb., 459  
 Clonostachys, Kl., 135  
 Clusiophyllum, M. Arg., 190  
 Clusia, Boerh., 188  
 Cluytia, Martyn., 188  
 Cluytiandra, M. Arg., 238  
 Cluytiopsis, M. Arg., 254  
 Cnemidostachys, Mart., 135  
 Cnesmone, Bl., 216  
 Cnesmosa, Bl., 216  
 Cnidocolus, Pohl., 113  
 Cocconeris, Miq., 196  
 Cocconerion, H. Bn., 193  
 Codium, Rumph., 191  
 Codonocalyx, Kl., 129

- Cœlodepas*, HASSK., 220  
*Cœlodiscus*, H. BN., 179  
*Coleostachys*, A. JUSS., 459  
*Collignataya*, MOL., 133  
*Colmeiroa*, REUT., 242  
*Colophonia*, COMMERS., 312  
*Comatoglossum*, KARST., 400  
*Comesperma*, LABILL., 89  
*Cometia*, DUP.-TH., 244  
*Commia*, LOUR., 135  
*Commiphora*, JACQ., 310  
*Comocladia*, P. BR., 322  
*Conceveiba*, AUBL., 207  
*Conceveiba*, KL., 212  
*Conceveibum*, RICH., 212  
*Coniogeton*, BL., 259  
*Connaropsis*, PL., 26  
*Conosapium*, M. ARG., 135  
*Cordemoya*, H. BN., 196  
*Corindum*, T., 419  
*Cortusina*, ECKL. & ZEYH., 9  
*Corynocarpus*, FORST., 327  
*Corytholobium*, MART., 89  
*Cossignia*, COMMERS., 422  
*Cotinus*, T., 322  
*Cremophyllum*, SCHWEIDL., 223  
*Cremostachys*, TUL., 184  
*Crepidaria*, HAW., 178  
*Crepidospermum*, HOOK. F., 310  
*Crossadenia*, BOISS., 108  
*Crossonophelis*, H. BN., 400  
*Croton*, L., 129, 225  
*Crotonanthus*, KL., 129  
*Crotonogyne*, M. ARG., 198  
*Crotonopsis*, MICHX., 226  
*Crototernum*, DESVX., 205  
*Crozophora*, NECK., 181  
*Cruckhanksia*, HOOK., 11  
*Cryptostemon*, W., 77  
*Cryptostomum*, SCHREB., 76  
*Ctenomeria*, HARV., 218  
*Cubilia*, BL., 395  
*Cucullaria*, SCHREB., 101  
*Cunuria*, H. BN., 190  
*Cupameni*, ADANS., 212  
*Cupania*, L., 398  
*Curcas*, ADANS., 114  
*Cyathogyne*, M. ARG., 243  
*Cyclostemon*, BL., 248  
*Cyclostigma*, KL., 129  
*Cylindrophora*, M. ARG., 223  
*Cyrtocarpa*, H. B. K., 316  
*Cyrtospermum*, BENTH., 325  
*Cytherea*, DC., 257  
*Cyttarospermum*, BOISS., 108  
  
*Dacryodes*, VAHL., 289  
*Dactylanthus*, HAW., 108  
*Dactylostemon*, KL., 135  
*Dalechampia*, PLUM., 223  
*Dalembertia*, H. BN., 232  
*Dalrympha*, ROXB., 342  
  
*Dammara*, GERTN., 260  
*Danatophorus*, ZIPP., 407  
*Dapania*, KORTH., 26  
*Daphniphyllum*, BL., 252  
*Daphnitis*, SPRENG., 319  
*Dasykarya*, LIEBM., 311  
*Dasycoleum*, TURCZ., 499  
*Debræa*, ROEM. & SCH., 96  
*Decadenia*, H. BN., 108  
*Decarinium*, RAFIN., 129  
*Deinbollia*, SCHUM., 397  
*Desfontenea*, VELLOZ., 181  
*Desmonema*, RAFIN., 152  
*Desmostachys*, PL., 331  
*Desmostemon*, THW., 191  
*Diacanthium*, BOISS., 108  
*Diacidia*, GRISEB., 458  
*Diadenaria*, KL., 178  
*Diasperus*, L., 252  
*Dibrachia*, ECKL. & ZEYH., 9  
*Dibrachion*, REG., 229  
*Dicella*, GRISEB., 458  
*Dichæactina*, HANCE, 254  
*Dichapetalum*, DUP.-TH., 139, 233  
*Dichulium*, BOISS., 108  
*Dichrophyllum*, KL., 105  
*Dicranopetalum*, PRESL., 419  
*Dictyoneura*, BL., 398  
*Didymocheton*, BL., 502  
*Didymococcus*, BL., 348  
*Digonocarpus*, VELLOZ., 398  
*Dimacria*, SWEET, 7  
*Dimereza*, LABILL., 398  
*Dimocarpus*, LOUR., 395  
*Dimorphanthera*, M. ARG., 208  
*Dimorphocalyx*, THW., 187  
*Dinmagonum*, A. JUSS., 467  
*Dinemandra*, A. JUSS., 467  
*Diplerisma*, PL., 370  
*Diplochlamys*, M. ARG., 196  
*Diploglottis*, HOOK. F., 416  
*Diplomorpha*, GRIFF., 255  
*Diplopeltis*, ENDL., 421  
*Diplopetalon*, SPRENG., 398  
*Diplopterys*, A. JUSS., 464  
*Diplostylis*, SOND., 210  
*Dischizolæna*, H. BN., 141  
*Discobeyeria*, M. ARG., 192  
*Discocarpus*, KL., 236  
*Discoclaoxylon*, M. ARG., 210  
*Discoleidion*, M. ARG., 203  
*Discophora*, MIERS., 330  
*Dissiliaria*, F. MUELL., 245  
*Distichostemon*, F. MUELL., 411  
*Ditaxis*, A. JUSS., 181  
*Ditrysinia*, RAFIN., 135  
*Dittia*, GRISEB., 205  
*Dittelasma*, HOOK. F., 359  
*Dittmaria*, SPRENG., 96  
*Dobinea*, HAM., 428  
*Dodecastemon*, HASSK., 248  
*Dodonæa*, L., 410  
  
*Dodonæa*, PLUM., 322  
*Doratoxylon*, DUP.-TH., 408  
*Doryxylon*, ZOLL., 195  
*Dracontomelon*, BL., 289  
*Drepadenium*, RAFIN., 129  
*Drepanospermum*, BENTH., 325  
*Drimycarpus*, HOOK. F., 326  
*Dryandra*, THUNB., 185  
*Drypetes*, VAHL., 248  
*Duania*, NORONH., 229  
*Duchola*, ADANS., 230  
*Dupuisia*, A. RICH., 315  
*Durandea*, PL., 47  
*Duvaua*, K., 266  
*Dysopsis*, H. BN., 209  
*Dysoxylum*, BL., 502  
  
*Eccremanthus*, THW., 396  
*Echinocroton*, F. MUELL., 196  
*Echinopterys*, A. JUSS., 453  
*Echinosphæra*, SIEB., 191  
*Echinus*, LOUR., 196  
*Ecphymacalyx*, POHL., 429  
*Ekebergia*, SPARM., 498  
*Elachocroton*, F. MUELL., 135  
*Elæococca*, COMMERS., 185  
*Elæococcus*, SPRENG., 185  
*Elæogene*, MRO., 152  
*Elaphrium*, JACQ., 262  
*Elateriospermum*, BL., 200  
*Elcaja*, FORSK., 474  
*Eleutherogynium*, M. ARG., 251  
*Eluteria*, GRISEB., 129  
*Elutheria*, P. BR., 475  
*Blutheria*, ROEM., 506  
*Embllica*, GERTN., 254  
*Embllicastrum*, M. ARG., 254  
*Emmenanthus*, HOOK. & ARN., 49  
*Emmotum*, DESVX., 329  
*Empleurosa*, BARTL., 410  
*Enantia*, FALCON., 345  
*Enchidion*, JACK., 187  
*Endospermum*, BENTH., 204  
*Engelmannia*, KL., 130  
*Enourea*, AUBL., 416  
*Enrila*, BLANC., 289  
*Ephelis*, SCHREB., 398  
*Epicharis*, BL., 502  
*Epiprinus*, GRIFF., 197  
*Epirizanthos*, BL., 74  
*Epistylum*, SW., 252  
*Eraclissa*, FORSK., 238  
*Eremanthus*, WALL., 204  
*Eremocarpus*, BENTH., 226  
*Eremophyton*, BOISS., 108  
*Eriandrostachys*, H. BN., 405  
*Eriococcoides*, M. ARG., 254  
*Eriococcus*, HASSK., 252  
*Eriocœlum*, HOOK. F., 399  
*Erioglossum*, BL., 359  
*Erisma*, RUDGE, 96, 103

- Erismanthus, WALL., 204  
 Erodium, LHER., 6, 36  
 Erythranthe, H. BN., 210  
 Erythrocarpus, BL., 200  
 Erythrochilus, REINW., 210  
 Erythrocoeca, BENTH., 210  
 Erythrophila, ARN., 421  
 Erythrophysa, E. MEY., 421  
 Erythroxylon, L., 49, 65  
 Esula, HAW., 105  
 Euacalypha, M. ARG., 212  
 Euadriana, H. BN., 205  
 Eualchornea, M. ARG., 213  
 Euamanoa, H. BN., 236  
 Euamperea, M. ARG., 215  
 Euargyrothamnia, M. ARG., 181  
 Eubersama, H. BN., 425  
 Eubeyeria, M. ARG., 192  
 Euburdackia, H. BN., 459  
 Eubursera, H. BN., 262  
 Eucaletia, M. ARG., 240  
 Eucephalocroton, M. ARG., 220  
 Euclaoxylon, M. ARG., 210  
 Eucleidion, M. ARG., 203  
 Eucodiaem, M. ARG., 191  
 Eucomesperma, H. BN., 89  
 Eudrypetes, H. BN., 219  
 Euechinus, H. BN., 196  
 Euepicharis, H. BN., 502  
 Euglochidion, M. ARG., 254  
 Euhireia, H. BN., 438  
 Eulasianthera, H. BN., 329  
 Euleptanthus, H. BN., 332  
 Eulium, PL., 45  
 Eumacaranga, M. ARG., 209  
 Eumecanthus, KL., 105  
 Eumicrodesnis, H. BN., 189  
 Eumorphia, ECKL. & ZEYH., 9  
 Euomphalea, H. BN., 230  
 Eupera, H. BN., 225  
 Euphorbia, L., 165, 177  
 Euphorbiastrium, KL., 108  
 Euphorbia, BOISS., 108  
 Euphoria, COMMERS., 395  
 Euphoria, J., 395  
 Euphyllanthus, GRISEB., 254  
 Euplukenetia, M. ARG., 223  
 Eupseudanthus, M. ARG., 241  
 Euroschinus, HOOK. F., 315  
 Eusavia, H. BN., 235  
 Euscaphis, SIEB. & ZUCC., 342  
 Eustathes, DC., 377  
 Eutragia, M. ARG., 218  
 Eutrigonostemon, M. ARG., 187  
 Eutropia, KL., 130  
 Evia, COMMERS., 257  
 Eviodes, H. BN., 340  
 Exocercaria, L., 133, 227  
 Exothea, MACF., 408  
 Eyrea, CHAMP., 343  
 Eystathes, LOUR., 377  
 Faguetia, MARCH., 320  
 Falconeria, ROYLE, 135  
 Farenheitia, REICHB. F., 152  
 Filicium, THW., 409  
 Flabellaria, CAV., 465  
 Flindersia, R. BN., 508  
 Floerkea, W., 20, 40  
 Fluggea, W., 242  
 Fluggeopsis, M. ARG., 254  
 Fontainea, HECK., 194  
 Forchhammeria, LIEBM., 152  
 Fragariopsis, A. S. H., 222  
 Fragiopsis, KARST., 135  
 Freireodendron, M. ARG., 248  
 Friesia, SPRENG., 226  
 Furcaria, BVN., 130  
 Gärtnera, SCHREB., 466  
 Galarrhæus, HAW., 108  
 Galearia, ZOLL. & MOR., 184  
 Galphimia, CAV., 460  
 Galurus, SPRENG., 212  
 Ganitrocarpus, PL., 189  
 Ganophyllum, BL., 410  
 Garcia, ROHR., 197  
 Gaudichaudia, H. B. K., 469  
 Gavaretia, H. BN., 208  
 Geblera, FISCH. & MEY., 242  
 Geiseleria, KL., 120  
 Gelfuga, H. BN., 242  
 Gelonium, GÄRTN., 398  
 Gelonium, ROXB., 200  
 Gemella, LOUR., 415  
 Genesiphylla, LHER., 253  
 Geranium, L., 3, 35  
 Geruaa, FORSK., 152  
 Gilibertia, GMEL., 495  
 Ginnania, REM., 495  
 Givotia, GRIFF., 194  
 Glandonia, GRISEB., 464  
 Glaucophyllum, HARV., 9  
 Glennica, HOOK. F., 403  
 Glochidion, FORST., 253  
 Glochidionopsis, BL., 252  
 Glochidiopsis, M. ARG., 254  
 Glochisandra, WIGHT, 252  
 Gluta, L., 316  
 Gomphandra, WALL., 329  
 Gomphidium, H. BN., 254  
 Gonioceton, BL., 502  
 Goniostema, H. BN., 108  
 Gonocaryum, MIQ., 333  
 Govania, WALL., 194  
 Granatum, KEN., 506  
 Grenvillea, SWEET, 8  
 Greyia, HOOK. & HARV., 426  
 Grielum, L., 10, 37  
 Grisollea, H. BN., 335  
 Guaranina, WEDD., 245  
 Guarea, L., 499  
 Guidonia, ADANS., 478  
 Guindelia, GILL., 417  
 Guioa, CAV., 398  
 Gussonia, SPRENG., 135  
 Gymnalypha, GRISEB., 212  
 Gymnanthes, SW., 135  
 Gymnarrhæa, LEANDR., 135  
 Gymniodes, H. BN., 340  
 Gymnobotrys, WALL., 135  
 Gymnocarpus, DUP.-TH., 246  
 Gymnoclaoxylon, M. ARG., 210  
 Gymnostillingia, M. ARG., 135  
 Gynamblosis, TORR., 120  
 Gynocephala, BL., 282  
 Gynoecephalum, ENDL., 282  
 Gynoon, A. JUSS., 252  
 Hadestaphyllum, DENNST., 325  
 Hæmatospermum, WALL., 179  
 Hæmatostaphis, HOOK. F., 316  
 Hæmatostemon, M. ARG., 221  
 Hancea, SEEM., 196  
 Harpephyllum, BERNH., 316  
 Harpullia, ROXB., 407  
 Harpulliastrium, H. BN., 407  
 Harpulliopsis, H. BN., 422  
 Hartighsea, A. JUSS., 502  
 Hasskaria, H. BN., 211  
 Hearnia, F. MUELL., 498  
 Hebeandra, BONPL., 89  
 Hebecocca, BEURL., 230  
 Hebeptalum, BENTH., 48  
 Hecatea, DUP.-TH., 230  
 Hedraistylus, HASSK., 223  
 Hedvigia, SW., 314  
 HedyCARDIUM, M. ARG., 254  
 HedyCarpus, JACK, 377  
 HedyCarpus, MIQ., 246  
 Heeria, MEISSN., 321  
 Heisteria, BERG., 88  
 Heladena, A. JUSS., 454  
 Helleria, NEES & MART., 53  
 Hemicicca, H. BN., 254  
 Hemicychia, WIGHT & ARN., 248  
 Hemiglochidion, M. ARG., 254  
 Hemigyrosa, BL., 415  
 Hemiphyllanthus, M. ARG., 254  
 Hemprichia, EHRENB., 310  
 Hendecandra, ESCHB., 130  
 Henleophytum, KARST., 461  
 Heptallon, RAFIN., 130  
 Hermesia, W., 212  
 Heterochlamys, TURCZ., 226  
 Heterodendron, DESF., 397  
 Heteroglochidion, M. ARG., 254  
 Heteropterys, H. B. K., 461  
 Heudelotia, A. RICH., 310  
 Hevea, AUBL., 187  
 Heynichia, K., 493  
 Hexadenia, KL., 178  
 Hieronyma, ALLEM., 243  
 Hippobromus, ECKL., 408  
 Hippocastanum, T., 367  
 Hippocrepandra, M. ARG., 183  
 Hippomane, L., 228  
 Hiptage, GÄRTN., 466  
 Hirra, JACQ., 438, 463

- Hitzeria, KL., 310  
 Hoarea, SWEET, 7  
 Holigarna, HAM., 325  
 Holopetalum, KL., 6  
 Homalanthus, BARTL., 229  
 Homonoya, LOUR., 179  
 Hoorniri, AUBL., 51, 66  
 Hualania, PHIL., 89  
 Huerteia, R. & PAV., 404  
 Hugonia, L., 46, 64  
 Humiria, J., 51  
 Humirum, H. BN., 53  
 Humirum, MART., 52  
 Hura, L., 230  
 Hyænanche, VAHL, 251  
 Hydrocera, BL., 19  
 Hylococcus, R. BR., 251  
 Hymenocardia, ENDL., 215  
 Hypelate, P. BR., 408  
 Hyperum, PRESL., 12  
 Hypopterygium, SCHLTL., 321  
 Hypseocharis, REMY, 26, 41
- Icacina, A. JUSS., 277  
 Icica, AUBL., 262  
 Impatiens, L., 17, 39  
 Iodes, BL., 340  
 Isandrión, H. BN., 246  
 Isolophus, SPACH, 72  
 Isopetalum, ECKL. & ZEYH., 9  
 Isopetalum, SWEET, 6  
 Isopteris, WALL, 91  
 Ixonanthes, ENDL., 49  
 Ixonanthes, JACK, 48, 65
- Jackia, BL., 76  
 Jagera, BL., 401  
 Janipha, H. B. K., 180  
 Janusia, A. JUSS., 468  
 Jatropha, L., 112, 179  
 Jenkinsia, GRIFF., 337  
 Jenkinsonia, SWEET, 9  
 Joannesia, GOM., 185  
 Johannesia, VELLOZ., 185  
 Jonquetia, SCHREB., 316  
 Jonsonia, ADAMS., 481  
 Jubelina, A. JUSS., 466  
 Juliania, SCHLTL., 321  
 Julocroton, MART., 226  
 Junghunia, MIQ., 139  
 Jussievia, HOUST., 113
- Keraselma, HAW., 105  
 Khaya, A. JUSS., 505  
 Kingsboroughia, LIEBM., 346  
 Kirganelia, A. JUSS., 253  
 Kittelocharis, ALEF., 45  
 Klotschiphytum, H. BN., 130  
 Knorrea, MOÇ. & SESS., 314  
 Kœlreuteria, LAMX., 420  
 Koilodepas, HASSK., 220
- Koon, GÆRTN., 403  
 Krameria, LOEFL., 77, 92  
 Kummeria, MART., 330  
 Kunthia, DENNST., 313
- Lacepedea, H. B. K., 343  
 Lachnometalum, TURCZ., 398  
 Lachnostylis, TURCZ., 239  
 Lanuæa, GUILLEM., 316  
 Lanneoma, DEL., 258  
 Lansium, RUMPH., 501  
 Lascadium, RAFIN., 152  
 Lasianthera, PAL. BEAUV., 329  
 Lasiocarpus, LIEBM., 455  
 Lasiocroton, GRISEB., 206  
 Lasiodora, H. BN., 340  
 Lasiogyne, KL., 130  
 Lasiostyles, PRESL., 203  
 Lassia, H. BN., 217  
 Laurembergia, H. BN., 212  
 Launzan, BUCHAN., 259  
 Laurophyllus, THUNB., 319  
 Lebidiera, H. BN., 237  
 Lebidieropsis, M. ARG., 236  
 Lecaniodiscus, PL., 401  
 Ledocarpum, ENDL., 11  
 Ledocarpum, DESF., 11  
 Leiocarpus, BL., 243  
 Leiopyxis, MIQ., 237  
 Lemniscia, SCHREB., 53  
 Lentiscus, T., 322  
 Lepidanthus, NUTT., 238  
 Lepidococlea, TURCZ., 182  
 Lepidocroton, PRESL., 182  
 Lepidopetalum, BL., 398  
 Lepidostachys, LINDL., 244  
 Lepidoturus, H. BN., 212  
 Lepisanthes, BL., 401  
 Leptaulus, BENTH., 332  
 Leptemon, RAFIN., 226  
 Leptobotrys, H. BN., 217  
 Leptonema, A. JUSS., 243  
 Leptophragma, R. BR., 483  
 Leptopus, DCNE., 238  
 Leptopus, KL. & GROCKE., 105  
 Leptorachys, KL., 218  
 Leretia, VELLOZ., 277  
 Leucadenia, KL., 130  
 Leucandra, KL., 217  
 Leucocroton, GRISEB., 199  
 Leucosia, DUP. TH., 139  
 Libanus, COLEBR., 312  
 Lightia, SCHROMB., 99, 104  
 Ligularia, ECKL. & ZEYH., 8  
 Limeum, FORSK., 238  
 Limnanthes, R. BR., 20  
 Linastrum, KL., 45  
 Linidion, H. BN., 183  
 Linopsis, REICHB., 43  
 Linostachys, KL., 212  
 Linostigma, KL., 13  
 Linostylis, ENDL., 210  
 Linum, L., 42, 63
- Liparene, POIT., 248  
 Lithoxylon, ENDL., 235  
 Lithræa, MIERS, 315  
 Llaguna, R. & PAV., 412  
 Llavea, PL., 346  
 Lobadium, RAFIN., 321  
 Lobocarpus, WIGHT & ARN., 152  
 Longetia, H. BN., 249  
 Lophanthera, A. JUSS., 456  
 Lophopterys, A. JUSS., 461  
 Lophostylis, HOCHST., 90  
 Lorenzeana, LIEBM., 346  
 Loureira, CAV., 114  
 Loxodiscus, HOOK. F., 422  
 Loxopterygium, HOOK. F., 319  
 Loxostylis, SPRENG., 318  
 Lumanaja, BLANCO, 179  
 Lyciopsis, BOISS., 108
- Mabea, AUBL., 207  
 Macaranga, DUP. TH., 208  
 Macintyria, F. MUELL., 76  
 Macphersonia, BL., 402  
 Macraea, LINDL., 13  
 Macrochiton, BL., 502  
 Macrolinum, REICHB., 45  
 Macrothyrsus, SPACH, 369  
 Madablota, SONNER., 466  
 Mafureira, BERTOL., 474  
 Magallana, CAV., 16  
 Magonia, A. S. H., 423  
 Mahagoni, CATESB., 478  
 Mainea, VELLOZ., 97  
 Malacmæa, GRISEB., 457  
 Mallea, A. JUSS., 493  
 Malleastrum, H. BN., 494  
 Mallotus, LOUR., 196  
 Malosma, NUTT., 321  
 Malpighia, L., 456  
 Mancanilla, PLUM., 228  
 Mancinella, TUSS., 228  
 Mangifera, L., 323  
 Manihot, PLUM., 180  
 Manniophyton, M. ARG., 198  
 Mappa, A. JUSS., 209  
 Mappia, JACQ., 277, 328  
 Maprounea, AUBL., 134  
 Mareya, H. BN., 213  
 Margaritaria, L. F., 254  
 Marignia, COMMERS., 261  
 Martiniera, GUILLEM., 12  
 Mascagnia, BERT., 438  
 Maschalanthus, NUTT., 238  
 Matayba, AUBL., 398  
 Mauria, K., 314  
 Meborea, AUBL., 254  
 Meckelia, MART., 455  
 Mecostylis, KURZ, 209  
 Medea, KL., 130  
 Medusanthera, SEEM., 329  
 Medusea, HAW., 108  
 Meineckia, H. BN., 242  
 Meisteria, SCOP., 328

- Melanolepis, REICHB. F., 196  
 Melanorrhæa, WALL., 317  
 Melia, L., 470, 493  
 Melianthus, T., 369, 425  
 Melicocera, L., 403  
 Melicopsidium, H. BN., 407  
 Meliosma, BL., 316, 393  
 Menarda, A. JUSS., 254  
 Meniscota, BL., 345  
 Mercurialis, T., 210  
 Merretia, SOLAND., 327  
 Mestotes, SOLAND., 139  
 Metopium, P. BR., 321  
 Mettenia, GRISEB., 152  
 Micrandra, BENTH., 189  
 Micrandra, R. BR., 187  
 Micranthea, LAMK., 240  
 Micranthea, DUP.-TH., 325  
 Micrantheum, DESF., 240  
 Micranthis, H. BN., 130  
 Microcaletia, M. ARG., 240  
 Micrococca, BENTH., 210  
 Microcroton, GRISEB., 130  
 Microdesmis, PL., 189  
 Microelus, WIGHT & ARN., 247  
 Microglochidion, M. ARG., 254  
 Micropetalum, POIT., 236  
 Microsepala, MIQ., 246  
 Microstachys, A. JUSS., 135  
 Mildea, MIQ., 399  
 Millingtonia, ROXB., 346  
 Milnea, ROXB., 501  
 Mintalia, FENZL., 242  
 Miquelia, MEISSN., 337  
 Mirabella, BERT., 209  
 Mischocarpus, BL., 398  
 Mischodon, THW., 190  
 Moacurra, ROXB., 139  
 Moldenhauera, SPRENG., 339  
 Molina, CAV., 466  
 Molina, C. GAY, 209  
 Molina, J., 398  
 Molle, CLUS., 266  
 Monguia, CHAPEL., 130  
 Monnina, R. & PAV., 89  
 Monodynamus, POHL, 324  
 Monosoma, GRIFF., 506  
 Monotaxidium, M. ARG., 215  
 Monotaxis, AD. BR., 183  
 Monsonia, L., 6, 36  
 Montabea, POEPP. & ENDL., 77  
 Moschoxylum, A. JUSS., 475  
 Moulinsia, CAMBESS., 359  
 Moutabea, AUBL., 76  
 Mozinna, ORTEG., 114  
 Mulli, FEUILL., 266  
 Mundtia, K., 88  
 Munronia, WIGHT, 494  
 Muraltia, NECK., 68  
 Myracrodruon, ALLEM., 318  
 Myriogomphus, DIEDR., 130  
 Myrodendron, SCHREB., 52  
 Myrrhidium, DC., 9  
 Mystax, RAY, 48  
 Nageia, ROXB., 249  
 Nanari, RUMPH., 312  
 Nanopetalum, HASSK., 237  
 Nansiotum, HAM., 338  
 Naregamia, WIGHT, 494  
 Nassavia, VELLOZ., 415  
 Natalia, HOCHST., 425  
 Natsiatum, HAM., 338  
 Nectris, PURSH, 20  
 Negundium, RAFIN., 375  
 Negundo, MOENCH, 375  
 Nemedra, A. JUSS., 501  
 Neoboutonia, M. ARG., 205  
 Neorepera, MUELL., 242  
 Nephelium, L., 395  
 Neurada, L., 9, 37  
 Neuras, DIOSC., 9  
 Nimmoia, WIGHT, 502  
 Nothapodytes, BL., 330  
 Nothopodia, BL., 325  
 Nothoprotium, MIQ., 327  
 Nummulariopsis, BOISS., 108  
 Nyalelia, DENNST., 501  
 Nylandtia, DUMORT., 88  
 Nymphanthus, LOUR., 254  
 Ocalia, KL., 130  
 Ochranthe, LINDL., 343  
 Ochthococcus, BENTH., 48, 64  
 Odina, ROXB., 316  
 Odontandra, H. B. K., 475  
 Odontilema, TURCZ., 212  
 Odontopetalum, B. H., 7  
 Odontosiphon, ROEM., 475  
 Oldfieldia, BENTH., 377  
 Oligostemon, TURCZ., 316  
 Omalanthus, A. JUSS., 229  
 Omphalandria, P. BR., 230  
 Omphalca, L., 230  
 Oneocarpus, A. GRAY, 324  
 Oococca, DC., 403  
 Ophiocaryon, SCHOMB., 347  
 Ophthalmobolapton, ALLEM., 231  
 Orama, TURCZ., 502  
 Orbicularia, H. BN., 254  
 Orbignya, BERT., 412  
 Oriflea, H. BN., 212  
 Ornithophe, J., 415  
 Ostodes, BL., 191  
 Otidia, SWEET, 8  
 Otolipsis, TURCZ., 398  
 Otonychium, BL., 407  
 Otophora, BL., 398  
 Oxalis, L., 22, 41  
 Oxalidistylis, H. BN., 253  
 Oxleya, A. CUNN., 508  
 Oxyx, T., 23  
 Ozoroa, DEL., 321  
 Pachylobus, DON., 312  
 Pachystemon, BL., 209  
 Pachystroma, KL., 228  
 Paiveusea, WELW., 311  
 Palanostigma, MART., 130  
 Palenga, THW., 249  
 Palissya, H. BN., 212  
 Pancevia, W., 359, 414  
 Panhopia, NORONH., 209  
 Pappaea, ECKL., 396  
 Paracroton, MIQ., 199  
 Paradenocline, M. ARG., 210  
 Paragomphidium, M. ARG., 254  
 Paraneuphedium, TEYSM., 398  
 Parishia, HOOK F., 318  
 Passaea, H. BN., 202  
 Paullinia, L., 416  
 Pausandra, RADLE., 183  
 Pavia, BOERH., 369  
 Payeria, H. BN., 239  
 Payeria, M. ARG., 495  
 Pedicellia, LOUR., 398  
 Pedilanthus, NECK., 178  
 Pegia, COLEBR., 316  
 Peixotoa, A. JUSS., 459  
 Pelargium, HARV., 9  
 Pelargonium, LINN., 7, 36  
 Peltandra, WIGHT, 254  
 Penicillanthemum, VIEILL., 47  
 Pennantia, FORST., 332  
 Pentabrachium, M. ARG., 236  
 Pentacocca, TURCZ., 48  
 Pentaglochidion, M. ARG., 254  
 Pentameria, KL., 236  
 Pentaspadon, HOOK F., 327  
 Pera, MUT., 224  
 Peridium, SCHOTT, 224  
 Periplexis, WALL., 248  
 Peripterygium, HASSK., 341  
 Peristera, ECKL. & ZEHL., 9  
 Persoonia, W., 506  
 Perula, SCHREB., 224  
 Petalodiscus, H. BN., 235  
 Petaloma, RAFIN., 108  
 Petalostigma, MART., 130  
 Petalostigma, F. MUELL., 251  
 Phædra, KL., 202  
 Phæocarpus, MART., 423  
 Philyra, KL., 181  
 Phlebocealyma, GRIFF., 333  
 Phlebochiton, WALL., 316  
 Phlebotenia, GRISEB., 88  
 Pholacidia, GRISEB., 474  
 Phoxanthus, BENTH., 347  
 Phylace, NORONH., 73  
 Phylera, ENDL., 181  
 Phyllanthidea, DIEDR., 238  
 Phyllanthopsis, SCHEEL, 238  
 Phyllaurea, LOUR., 191  
 Phyllobotryum, M. ARG., 153  
 Phyllocalyx, H. BN., 254  
 Phyllocosmus, KL., 48  
 Phyllopassæa, M. ARG., 202  
 Phylloxylon, H. BN., 153  
 Phymatanthus, SWEET, 9  
 Physoglochidion, M. ARG., 254

- Phytocrene, WALL., 282, 336  
 Pierandia, BR., 246  
 Pierardia, ROXB., 246  
 Pierotia, BL., 49  
 Pimela, LOUR., 312  
 Pimeleodendron, HASSK., 229  
 Piptocelus, TURCZ., 266  
 Piptosaccos, TURCZ., 483  
 Piranhea, H. BN., 247  
 Pistacia, L., 322  
 Plagianthera, ZOLL., 196  
 Plagiotaaxis, WALL., 505  
 Plapertia, REICHR., 139  
 Platea, BL., 334  
 Platygyne, MERC., 215  
 Platynema, WIGHT, 467  
 Platytheca, STEETZ., 70  
 Pleiostemon, SOND., 254  
 Pleuranthes, H. BN., 330  
 Pleuropetalum, BL., 334  
 Plesslea, ENDL., 312  
 Plukenetia, PLUM., 220  
 Podandrea, THW., 196  
 Podocalyx, KL., 245  
 Podonophellum, H. BN., 396  
 Podostachys, KL., 130  
 Pogonophora, MIERS, 189  
 Pogonophyllum, DIEDR., 189  
 Pogopetalum, BENTH., 328  
 Poinsettia, GRAH., 108  
 Polyactia, ECKL. & ZEYH., 8  
 Polybaea, KL., 202  
 Polychisma, TURCZ., 8  
 Polygala, T., 71, 87  
 Pometia, FERST., 396  
 Pongaea, SCHREB., 419  
 Pongolam, RHEED, 249  
 Poranthera, RUDG., 238  
 Poraqueiba, AUBL., 328  
 Portesia, CAV., 574  
 Portulacastrum, BOISS., 108  
 Prasoxylon, ROEM., 502  
 Prosorus, DALZ., 254  
 Protaxanthus, DIEDR., 133  
 Protionopsis, BL., 310  
 Protium, BURM., 262  
 Protium, WIGHT & ARN., 310  
 Pseudacalypha, BOISS., 108  
 Pseudanthus, SPRENG., 241  
 Pseudatalaya, H. BN., 419  
 Pseudocroton, M. ARG., 200  
 Pseudomenarda, M. ARG., 254  
 Pseudopterys, H. BN., 409  
 Pseudorottleria, ZOLL., 208  
 Pseudotrewia, MIQ., 212  
 Psilostachys, TURCZ., 203  
 Psychanthus, DC., 72  
 Pteroxylon, ECKL. & ZEYH., 406  
 Pterandra, A. JUSS., 429, 452  
 Pteridophyllum, THW., 410  
 Pterococcus, HASSK., 223  
 Pterosiphon, TURCZ., 481  
 Ptilochaeta, TURCZ., 463  
 Putranjiva, WALL., 249  
 Putzeysia, PL., 369  
 Pycnocomia, BENTH., 206  
 Pycnosandra, BL., 248  
 Pyrenacantha, HOOK., 339  
 Qualea, AUBL., 102  
 Quilesia, BLANCO, 130  
 Quivisia, COMMERS., 495  
 Racapa, ROEM., 506  
 Racaria, AUBL., 377  
 Radiola, DILL., 45  
 Ramelia, H. BN., 214  
 Raphiostylis, PL., 331  
 Ratiga, M. ARG., 217  
 Ratonia, DC., 398  
 Redia, CASAR., 203  
 Regnaldia, H. BN., 153  
 Reidia, WIGHT, 254  
 Reinwardtia, DUMORT., 45  
 Reissipa, STEUD., 183  
 Rhaganus, E. MEY., 425  
 Rhinocarpus, BERT., 324  
 Rhizanthium, BOISS., 108  
 Rhopalostylis, KL., 223  
 Rhopium, SCHREB., 254  
 Rhus, L., 321  
 Rhynchotheca, R. & PAV., 13, 38  
 Richeria, VAHL, 245  
 Ricinella, M. ARG., 201  
 Ricinocarpos, DESF., 191  
 Ricinocarpus, BOERH., 130  
 Ricinodendron, M. ARG., 114  
 Ricinoides, T., 130  
 Ricinus, T., 109, 178  
 Rodschiedia, MIQ., 90  
 Roelana, COMMERS., 49  
 Roemeria, THUNB., 321  
 Reperia, SPRENG., 191  
 Rohria, SCHREB., 141  
 Roia, SCOP., 478  
 Romoia, BUCH., 230  
 Rottlera, ROXB., 196  
 Rottleropsis, M. ARG., 196  
 Roucheria, PL., 47  
 Ruagea, KARST., 499  
 Rumphia, L., 286  
 Ryparia, BL., 153  
 Ryssopterys, BL., 460  
 Sabia, COLEBR., 315, 393  
 Saccoglottis, MART., 53  
 Sadrum, SOLAND., 339  
 Sagotia, H. BN., 186  
 Sajorium, ENDL., 223  
 Salaberria, NECK., 316  
 Salinonia, NECK., 101  
 Salomonina, LOUR., 74  
 Salvertia, A. S. H., 93, 101  
 Samaropyxis, MIQ., 245  
 Sandorium, CAV., 503  
 Santiria, BL., 313  
 Sapindus, PLUM., 348, 395  
 Sapiopsis, M. ARG., 135  
 Sapium, JACO., 135  
 Sarcanthidion, H. BN., 334  
 Sarcocaulon, B. H., 6  
 Sarcocelinium, WIGHT, 184  
 Sarcostigma, WIGHT, 338  
 Sarcotrichia, BL., 47  
 Sarcotrichia, TURCZ., 266  
 Sarothrostachys, KL., 135  
 Sauropus, BL., 255  
 Savia, W., 235  
 Scepasma, BL., 252  
 Schieckea, KARST., 377  
 Schinus, L., 266, 314  
 Schinza, DENNST., 182  
 Schismatopera, KL., 224  
 Schizochiton, SPRENG., 504  
 Schleicheria, W., 403  
 Schmalzia, DESVX., 321  
 Schmardea, KARST., 506  
 Schmidelia, L., 415  
 Schorigeram, ADANS., 217  
 Schousboea, SCHUM., 212  
 Schoutensia, ENDL., 500  
 Schuechia, ENDL., 102  
 Schwagrighenia, REICHR., 314  
 Schwannia, ENDL., 441, 468  
 Sclerocarya, HOCHST., 259, 309  
 Sclerocroton, HOCHST., 135  
 Scleroglochidion, M. ARG., 254  
 Scolopacium, ECKL. & ZEYH., 6  
 Scorodendron, BL., 400  
 Seutinanthus, THW., 313  
 Seytalia, GERTN., 395  
 Sebastiania, SPRENG., 135  
 Secretaria, M. ARG., 153  
 Securidaca, L., 90  
 Securinea, J., 241  
 Securinegastrum, M. ARG., 242  
 Seidelia, H. BN., 210  
 Selbya, ROEM., 501  
 Semeocarpus, L. F., 324  
 Semeiocardium, ZOLL., 73  
 Semiarillaria, R. & PAV., 416  
 Senefeldera, MART., 227  
 Senega, DC., 72  
 Senefeldera, ENDL., 227  
 Seriana, SCHUM., 418  
 Serjania, PLUM., 418  
 Serophyton, BENTH., 182  
 Sethia, H. B. K., 49  
 Seymouria, SWEET, 8  
 Shakua, BOJ., 258  
 Sidalchornea, M. ARG., 213  
 Silvaea, HOOK. & ARN., 187  
 Sioja, HAM., 341  
 Smodingium, E. MEY., 320  
 Solenocarpus, WIGHT, 315  
 Sonzaya, MARCH., 313  
 Sorindeia, DUP.-TH., 315  
 Soyimida, A. JUSS., 505  
 Spachen, A. JUSS., 455

- Spanoghea, BL., 395  
 Spathiostemon, BL., 179  
 Speranskia, H. BN., 181  
 Sphaerococca, DC., 403  
 Sphaerosacme, WALL., 501  
 Sphaerostylis, H. BN., 221  
 Sphedannocarpus, PL., 462  
 Sphragidia, THW., 248  
 Sprostachys, SOND., 135  
 Spixia, LEANDR., 224  
 Spondias, L., 257, 308  
 Stachydium, BOISS., 108  
 Stachystemon, PL., 241  
 Stadmania, LAMK., 395  
 Stagmaria, JACK., 316  
 Staphylea, L., 344, 392  
 Staphylodendron, T., 344  
 Staurothylax, GRIFF., 254  
 Stegeria, M. ARG., 191  
 Stelechthantaria, DUP.-TH., 153  
 Stemonurus, BL., 329  
 Stenogonium, M. ARG., 248  
 Stenonia, DIEDR., 182  
 Stenonia, H. BN., 236  
 Stephanopodium, POEPP., 141  
 234  
 Sterigmanthe, KL., 108  
 Steudelia, SPRENG., 49  
 Stigmaphyllon, A. JUSS., 460  
 Stilaginella, TUL., 243  
 Stilago, SCHREB., 242  
 Stillingfleetia, BOJ., 135  
 Stillingia, GARDEN., 135  
 Stipellaria, BENTH., 212  
 Stocksia, BENTH., 420  
 Stolidanthus, H. BN., 180  
 Stomatocalyx, GRIFF., 229  
 Streptostigma, THW., 407  
 Struckeria, VELLOZ., 101  
 Stylodiscus, BENN., 247  
 Styphonia, NUTT., 322  
 Succowia, DENNST., 466  
 Sumbavia, H. BN., 195  
 Suregada, ROXB., 200  
 Swietenia, L., 478, 504  
 Swintonia, GRIFF., 317  
 Syllinum, PL., 45  
 Symphyllanthus, VAHL, 139  
 Symphyllia, H. BN., 220  
 Synadenium, BOISS., 108  
 Synaspisma, ENDL., 191  
 Syndesmis, WALL., 316  
 Synostemon, F. MUELL., 254  
 Synoum, A. JUSS., 500
- Teniosapium, M. ARG., 136  
 Tagira, M. ARG., 218  
 Talisia, AUBL., 400  
 Tandonia, H. BN., 181  
 Tannodia, H. BN., 181  
 Tapiria, J., 316  
 Tapirira, AUBL., 316
- Tapura, AUBL., 141, 234  
 Telephioides, T., 238  
 Telogyne, H. BN., 187  
 Telopea, SOLAND., 185  
 Terebinthus, T., 322  
 Tetractinostigma, HASSK., 244  
 Tetragastris, GERTN., 206  
 Tetragyne, MIQ., 153  
 Tetrapandra, H. BN., 231  
 Tetrapterys, CAV., 464  
 Tetratheca, SM., 70  
 Tetrorethidium, POEPP., 211  
 Thecacoris, A. JUSS., 243  
 Thinouia, TR. & PL., 405  
 Thouinia, POIT., 405  
 Thryallis, MART., 460  
 Thyana, HAM., 405  
 Thyrsoodium, BENTH., 327  
 Thyrsoodium, B. H., 313  
 Tigilium, KL., 130  
 Timandra, KL., 130  
 Tina, BL., 407  
 Tina, ROEM. & SCH., 398  
 Tirucalli, BOISS., 108  
 Tithymaloides, T., 178  
 Tithymalopsis, KL., 108  
 Tithymalus, BOISS., 108  
 Torpesia, ROEM., 474  
 Toulisia, AUBL., 419  
 Touloucouna, ROEM., 506  
 Tournefortia, SCOP., 181  
 Toxicodendron, GERTN., 415  
 Toxicodendron, T., 321  
 Toxicodendron, THUNB., 251  
 Trachycaryon, KL., 205  
 Traganthus, KL., 202  
 Tragia, PLUM., 217  
 Treisia, HAW., 108  
 Tremandra, R. BR., 70  
 Trewia, L., 206  
 Triadica, LOUR., 135  
 Trianthema, SPRENG., 210  
 Triaspis, BURCH., 465  
 Tribulastrum, LIPP., 10  
 Tricaryum, LOUR., 254  
 Triceraia, W., 343  
 Triceros, LOUR., 342, 392  
 Tricholophus, SPACH, 72  
 Trichoseypha, HOOK. F., 315  
 Trichosterigma, KL., 108  
 Tricomaria, HOOK., 462  
 Tridesmis, LOUR., 130  
 Trigonia, AUBL., 97, 103  
 Trigoniastrum, MIQ., 91  
 Trigonocarpus, VELLOZ., 398  
 Trigonostemon, BL., 187  
 Trigonostemon, BL., 187  
 Triomma, HOOK. F., 312  
 Triopteris, L., 464  
 Tripterocarpus, MEISSN., 417  
 Trismegista, ENDL., 210  
 Tristellateia, DUP.-TH., 467  
 Trisygyne, H. BN., 153
- Tritaxis, H. BN., 188  
 Tropæolum, L., 14, 39  
 Tsientani, RHEED., 286  
 Turpinia, RAFIN., 321  
 Turpinia, VENT., 345  
 Turraea, L., 495  
 Turraeanthus, H. BN., 500  
 Tylosepalum, KURZ, 191  
 Tyria, KL., 202
- Uapaca, H. BN., 246  
 Uitenia, NORONH., 359  
 Ungadia, ENDL., 423  
 Urandra, THW., 329  
 Urvillea, H. B. K., 418  
 Usteria, DENNST., 212  
 Usubis, BURM., 415
- Valenzuelia, BERT., 417  
 Vantanea, AUBL., 53  
 Vantaneoides, RICH., 54  
 Vargasia, BERHT., 405  
 Vavæa, BENT., 495  
 Venelia, COMMERS., 49  
 Vernicia, LOUR., 185  
 Verrucularia, A. JUSS., 456  
 Villanova, POURC., 242  
 Villaresia, R. & PAV., 334  
 Viviania, CAV., 13, 38  
 Vochy, AUBL., 101  
 Vochya, VANDELL., 101  
 Vochysia, J., 101  
 Vouarana, AUBL., 398
- Walhenbergia, R. BR., 139  
 Wartmannia, M. ARG., 229  
 Wendtia, MEYEN, 12, 38  
 Wetria, H. BN., 213  
 Wielandia, H. BN., 142, 234  
 Williamia, H. BN., 254  
 Williamiandra, GRISEB., 254  
 Wirtgenia, JUNGH., 257  
 Wurtzia, H. BN., 254
- Xanthoceras, BGE., 413  
 Xantholinum, REICH., 43  
 Xanthophyllum, ROXB., 76, 91  
 Xeropetalon, HOOK., 13  
 Xerospermum, BL., 396  
 Xylocarpus, SCHREB., 506  
 Xylophylla, L., 253
- Zarcoa, LAN., 236  
 Zuckertia, H. BN., 218  
 Zurloa, TEN., 499  
 Zygolepis, TURCZ., 398  
 Zygophyllidium, BOISS., 108  
 Zygosperrum, THW., 254  
 Zymum, NORONH., 467







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